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EPA METHOD STUDY 29,
METHOD 624--PURGEABLES

by

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16. ABSTRACT

The work which is described in the report was performed for the purpose of validating, through an interlaboratory study, Method 624 for the analysis of the volatile organic priority pollutants. This method is based on purging and concentration of the various analytes on an adsorbent followed by thermal desorption onto a gas chromatographic column. A low resolution mass spectrometer serves as the measuring device.

Participating laboratories were selected based upon technical evaluation of proposals and upon the analyses results of prestudy samples. The laboratories were supplied with ampuls containing various concentrations of the pollutant compounds. These solutions were aliquoted into four different water types which were subsequently analyzed according to the appropriate methods. In addition to the sample concentrates, each laboratory was supplied with an industrial effluent which was know to contain various pollutants and which was used to estimated false positive and false negative data.

The data obtained from the interlaboratory study were analyzed employing a series of computer programs known as the Interlaboratory Method Validation Study (IMVS) system which was designed to implement ASTM procedure D2777.

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The information in this document has been funded wholly or in part by the United States Environmental Protection Agency under contract 68-03-3102 to Radian Corporation. Radian prepared this report using EPA's procedures for data analysis and reporting of data. The conclusions and recommendations follow EPA review comments. It has been subject to the agency's peer and administrative review, and it has been approved for publication as an EPA document. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

FOREWORD

Environmental measurements are required to determine the quality of ambient waters and the character of waste effluents. The Environmental Monitoring and Support Laboratory (EMSL)-Cincinnati conducts research to:

- Develop and evaluate techniques to measure the presence and concentration of physical, chemical, radiological pollutants in water, wastewater, bottom sediments, and solid waste.
- Investigate methods for the concentration, recovery, and identification of viruses, bacteria, and other microorganisms in water.
- Conduct studies to determine the responses of aquatic organisms to water quality.
- Conduct an Agency-wide quality assurance program to assure standardization and quality control of systems for monitoring water and wastewater.

This publication, Interlaboratory Method Study for EPA Method 624 reports the results of EPA's interlaboratory method study for the volatile organic compounds.

Federal agencies, states, municipalities, universities, private laboratories, and industry should find this interlaboratory study useful in monitoring and controlling pollution in the environment.

Robert L. Booth, Acting Director

ABSTRACT

The work which is described in the report was performed for the purpose of validating, through an interlaboratory study, proposed Method 624 for the analysis of the volatile organic priority pollutants. This method is based on purging and concentration of the various analytes on an adsorbent followed by thermal desorption onto a gas chromatographic column. A low resolution mass spectrometer serves as the measuring device.

Participating laboratories were selected based upon technical evaluation of proposals and upon the analytical results of pre-study samples. The laboratories were supplied with ampules containing various concentrations of the pollutant compounds. These solutions were aliquoted into four different water types which were subsequently analyzed according to the appropriate methods. In addition to the sample concentrates, each laboratory was supplied with an industrial effluent which was known to contain various pollutants. The purpose of this sample was to ascertain the propensity of the method to produce false positives and false negatives.

The data obtained from the interlaboratory study were analyzed employing a series of computer programs known as the Interlaboratory Method Validation Study (IMVS) system which was designed to implement ASTM procedure D2777. The IMVS analyses included tests for the rejection of outliers (both laboratory and individual), estimation of mean recovery (accuracy), estimation of single-analyst and overall precision, and tests for the effects of water type on accuracy and precision.

This report was submitted in partial fulfillment of contract number 68-03-3102 by Radian Corporation under the sponsorship of the U.S. Environmental Protection Agency. The report covers a period from January, 1982 to June, 1983.

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SECTION 1

INTRODUCTION

The various analytical laboratories of the U.S. Environmental Protection Agency (EPA) gather water quality data to provide information on water resources, to assist research activities, and to evaluate pollution abatement activities. The success of these pollution control activities depends upon the reliability of the data provided by the laboratories, particularly when legal action is involved.

The Environmental Monitoring and Support Laboratory-Cincinnati (EMSL-Ci), of the EPA develops analytical methods and conducts quality assurance programs for the water laboratories. The quality assurance program of EMSL is designed to maximize the reliability and legal defensibility of all water quality information collected by EPA laboratories. The responsibility for these activities of EMSL is assigned to the Quality Assurance Branch (QAB). One of these activities is to conduct interlaboratory tests of the methods. This study reports the results of the validation effort on Method 624 for the volatile organic compounds.

The interlaboratory study of EPA Method 624 consisted of three distinct phases. Phase I involved the preparation and ampuling of concentrates of the compounds. The prepared concentrations were then verified using GC methods.

The second phase involved the selection of participating laboratories. Solicitations were made for both paid participants and volunteer participants. Selection of laboratories was based on experience, facilities, quality control procedures, and cost estimates received from laboratories. Final selection of fifteen laboratories was made after the successful analysis of a performance sample. No laboratories chose to participate in the study as volunteers.

The third phase involved the conduct of the study. The prepared ampules were distributed to each laboratory. Each laboratory supplied the required four water types into which the ampules were spiked. In addition, a single water sample was supplied by Radian to evaluate the method's tendencies for false-positives and false-negatives. After analysis, results were reported on standard data sheets. Data were keypunched and validated by Radian. The final step in the study was to conduct an analysis of all data obtained using US EPA's IMVS computer programs.

SECTION 2

CONCLUSIONS

Method 624 is acceptable for the analysis of purgeable priority pollutants. The accuracy of the method is judged very good while overall precision and single-analyst precision are considered acceptable. For most compounds, matrix does not significantly effect the analysis. Method 624 was characterized in terms of accuracy, overall precision, single-analyst precision, and the effect of water type on accuracy and precision through statistical analyses of 9,880 reported values. Estimates of accuracy and precision were made and expressed as regression equations, shown in Table 1 for each compound. The equations were based on the 8,446 data values remaining after eliminating 1,434 values (approximately 15%) designated as outliers by the IMVS programs. The development and interpretation of these regression equations are discussed in Section 5. To facilitate the interpretation of these equations, Table 2 was prepared. In Table 2, accuracy (percent recovery), overall precision (percent standard deviation), and single-analyst precision (percent standard deviation) were computed (using the regression equations) at a concentration of 100 μg/L.

Accuracy is obtained by comparing the mean recovery to the prepared values of the concentrations and computing the percent recovery. Overall, recoveries for the volatile organic compounds are very good for all of the water matrices with an average recovery of 100%. The mean recovery statistics (at 100 μg/L) for the volatile organic compounds range from 68% for bromomethane in the surface water matrix to 123% for cis-1,3-dichloropropene in the distilled water. One-half of the mean recoveries are between 94% and 105%, with one-fourth of the mean recoveries above and below these values. Recoveries for bromomethane are consistently low (ranging from 68% to 75%) for all water matrices. Mean recoveries for cis-1,3-dichloropropene and 1,2-dichloropropane are high with recoveries ranging from 116% to 123%, while the recovery of trans 1,3-dichloropropene is uniformly low, averaging 83%. It is known that the isomers of 1,3-dichloropropene are relatively unstable and may decompose to 1,3-dichloropropane.

The overall standard deviation of the analytical results is an indication of the precision associated with the measurement generated by a group of laboratories. The percent relative standard deviation (RSD) at 100 μg/L for the volatile organic compounds range from 13% for trichloroethene, 1,1-dichloroethane, and 1,2-dichloropropane in the various water matrices to 60% for chloromethane in the industrial effluent with a median value of 24%. Precision for chloromethane is relatively poor for all water matrices with percent relative standard deviations ranging from 45% to 60%. One-half of the RSDs are between 20% and 29%. In 95% of the cases the RSDs are less than 44%.

The percent relative standard deviation for a single analyst (RSD-SA) indicates the precision associated within a single laboratory. The RSD-SA for samples at 100 μg/L ranges from 11% for carbon tetrachloride (distilled water matrix) and 1,2-dichloropropane (tap water matrix) to 58% for chloromethane in the industrial effluent with a median RSD-SA of 19%. Single-analyst precision for chloromethane is relatively poor with RSD-SAs ranging from 37% to 58%. One-half of the RSD-SAs at 100 μg/L are between 15% and 23%. In 95% of the cases, the RSD-SAs are less than 36%.

Three compounds used in this study, bromomethane, chloromethane and chloroethane, are gases in pure form. Although there are no clear trends for accuracy in the gaseous species as opposed to less volatile compounds, it is possible that the low recovery observed for bromomethane and the poor precision for all three compounds may be due to inherent difficulties in handling gaseous and extremely volatile compounds during the various preparation and analytical procedures required in the method. Bromomethane is also known to be unstable, which could also account for low recoveries.

The effect of water type was different for the various volatile organic compounds. For most compounds the water matrix does not have a great effect on either the accuracy or precision. Over all, recoveries for the volatile organic compounds averaged 100% in distilled water, 101% in tap water and surface water, and 97% in the industrial effluent matrix. Precision (RSD and RSD-SA) for the volatile organic compounds ranged from a median RSD of 21% and a median RSD-SA of 16% for the distilled water to a median RSD of 25% and a median RSD-SA of 23% for the industrial effluent matrix.

A trend toward higher recoveries (above 100%) for the lowest concentration Youden pairs was observed for 10 compounds. One explanation could be sample contamination from the presence of these compounds in the laboratory. Methylene chloride displayed the most pronounced example with recoveries averaging 142%, 76% and 83% for the low, medium and high pairs respectively. Low-level contamination may be responsible for the 142% recovery of the low pair. Blank concentrations were also higher for methylene chloride than for many of the other compounds, indicating a greater likelihood of low-level sample contamination. This explanation is less clear for other compounds. For example, the trend is more pronounced for the chlorobenzenes than for benzene or chloroform, yet the latter compounds would be expected to be more ubiquitous in a laboratory environment.

TABLE 1-1

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

REGRESSION EQUATIONS FOR ACCURACY AND PRECISION

WATER TYPE	BENZENE	BROMODICHLOROMETHANE	BROMOFORM*	BROMOMETHANE
APPLICABLE CONC. RANGE	(10.8 - 480.0)	(8.0 - 480.0)	(9.0 - 400.0)	(9.1 - 607.0)
DISTILLED WATER				
SINGLE-ANALYST PRECISION	SR = 0.26X - 1.74	SR = 0.15X + 0.59	SR = 0.14X + 0.19	SR = 0.27X - 0.50
OVERALL PRECISION	S = 0.25X - 1.33	S = 0.20X + 1.13	S = 0.20X + 1.18	S = 0.25X + 0.64
ACCURACY	X = 0.93C + 2.00	X = 1.03C - 1.58	X = 1.01C - 0.89	X = 0.72C - 0.79
TAP WATER				
SINGLE-ANALYST PRECISION	SR = 0.23X - 0.24	SR = 0.17X + 0.94	SR = 0.31X + 1.36	SR = 0.29X - 0.45
OVERALL PRECISION	S = 0.22X - 0.75	S = 0.20X + 3.76	S = 0.33X + 1.03	S = 0.34X + 0.57
ACCURACY	X = 0.95C + 1.40	X = 1.03C + 1.35	X = 1.13C - 1.07	X = 0.69C - 1.14
SURFACE WATER				
SINGLE-ANALYST PRECISION	SR = 0.15X - 0.60	SR = 0.18X + 0.43	SR = 0.18X + 0.06	SR = 0.24X - 0.15
OVERALL PRECISION	S = 0.23X - 1.02	S = 0.22X + 0.80	S = 0.26X + 0.98	S = 0.25X + 0.67
ACCURACY	X = 0.94C + 1.88	X = 1.00C - 1.02	X = 0.97C - 0.67	X = 0.69C - 0.51
INDUSTRIAL EFFLUENT				
SINGLE-ANALYST PRECISION	SR = 0.14X - 0.91	SR = 0.23X - 0.15	SR = 0.28X - 0.02	SR = 0.37X - 0.21
OVERALL PRECISION	S = 0.22X - 0.86	S = 0.22X + 1.01	S = 0.33X + 0.49	S = 0.41X - 0.07
ACCURACY	X = 0.89C + 1.60	X = 0.94C - 0.93	X = 0.95C - 1.65	X = 0.76C - 0.80

X = MEAN RECOVERY
C = TRUE VALUE FOR THE CONCENTRATION

*Revised regression equations and estimates of accuracy and precision are given in Tables 12 and 13.

TABLE 1-2

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

REGRESSION EQUATIONS FOR ACCURACY AND PRECISION

WATER TYPE	CARBON TETRACHLORIDE*	CHLOROBENZENE	CHLOROETHANE*	CHLOROFORM
APPLICABLE CONC. RANGE	(9.0 - 400.0)	(13.5 - 600.0)	(7.3 - 438.0)	(4.5 - 300.0)
DISTILLED WATER				
SINGLE-ANALYST PRECISION	SR = 0.11X + 0.35	SR = 0.16X - 0.09	SR = 0.23X + 2.02	SR = 0.16X + 0.22
OVERALL PRECISION	S = 0.14X + 0.17	S = 0.26X - 1.92	S = 0.27X + 1.95	S = 0.18X + 0.16
ACCURACY	X = 1.01C - 0.84	X = 0.98C + 2.28	X = 1.08C + 1.50	X = 0.93C + 0.33
TAP WATER				
SINGLE-ANALYST PRECISION	SR = 0.23X - 0.85	SR = 0.19X + 0.69	SR = 0.31X - 0.71	SR = 0.23X + 0.42
OVERALL PRECISION	S = 0.24X - 0.87	S = 0.22X - 0.30	S = 0.35X + 0.04	S = 0.31X + 5.58
ACCURACY	X = 1.07C - 1.66	X = 1.02C + 2.04	X = 1.10C + 0.13	X = 0.87C + 5.78
SURFACE WATER				
SINGLE-ANALYST PRECISION	SR = 0.16X + 0.98	SR = 0.19X - 0.81	SR = 0.22X + 1.63	SR = 0.22X - 0.30
OVERALL PRECISION	S = 0.19X + 0.95	S = 0.29X - 2.60	S = 0.28X + 1.47	S = 0.23X - 0.08
ACCURACY	X = 1.01C - 0.22	X = 1.01C + 2.91	X = 1.09C + 1.83	X = 0.91C + 0.65
INDUSTRIAL EFFLUENT				
SINGLE-ANALYST PRECISION	SR = 0.20X - 0.29	SR = 0.23X + 0.13	SR = 0.32X + 0.25	SR = 0.14X + 0.33
OVERALL PRECISION	S = 0.20X + 0.54	S = 0.36X - 2.20	S = 0.38X - 0.21	S = 0.18X + 0.65
ACCURACY	X = 0.95C - 0.62	X = 0.92C + 2.36	X = 1.12C + 0.44	X = 0.94C + 0.37

X = MEAN RECOVERY
C = TRUE VALUE FOR THE CONCENTRATION

*Revised regression equations and estimates of accuracy and precision are given in Tables 12 and 13.

TABLE 1-3

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

REGRESSION EQUATIONS FOR ACCURACY AND PRECISION

WATER TYPE	CHLOROMETHANE*	CIS-1,3-DICHLOROPROPENE	DIBROMOCHLOROMETHANE	ETHYL BENZENE
APPLICABLE CONC. RANGE	(7.0 - 469.0)	(8.0 - 357.0)	(8.1 - 360.0)	(15.0 - 690.0)
DISTILLED WATER				
SINGLE-ANALYST PRECISION	SR = 0.41X + 1.75	SR = 0.19X + 0.44	SR = 0.17X - 0.18	SR = 0.14X + 1.00
OVERALL PRECISION	S = 0.49X + 1.21	S = 0.24X + 0.07	S = 0.17X + 0.49	S = 0.26X - 1.72
ACCURACY	X = 0.94C + 2.37	X = 1.24C - 0.55	X = 1.01C - 0.03	X = 0.98C + 2.48
TAP WATER				
SINGLE-ANALYST PRECISION	SR = 0.43X + 0.09	SR = 0.21X + 0.38	SR = 0.23X - 0.24	SR = 0.22X + 0.90
OVERALL PRECISION	S = 0.45X - 0.21	S = 0.27X + 0.55	S = 0.26X + 0.88	S = 0.24X - 0.77
ACCURACY	X = 0.90C + 0.20	X = 1.21C - 0.47	X = 1.07C - 0.44	X = 0.99C + 2.97
SURFACE WATER				
SINGLE-ANALYST PRECISION	SR = 0.37X - 0.46	SR = 0.26X - 0.09	SR = 0.20X - 0.39	SR = 0.15X + 0.38
OVERALL PRECISION	S = 0.45X + 0.55	S = 0.32X - 0.33	S = 0.21X - 0.18	S = 0.22X - 1.25
ACCURACY	X = 1.12C - 0.56	X = 1.16C + 0.18	X = 1.01C + 0.10	X = 1.01C + 3.88
INDUSTRIAL EFFLUENT				
SINGLE-ANALYST PRECISION	SR = 0.59X - 1.33	SR = 0.15X + 0.33	SR = 0.18X - 0.38	SR = 0.24X + 0.03
OVERALL PRECISION	S = 0.61X - 1.10	S = 0.25X + 0.01	S = 0.26X - 0.87	S = 0.29X - 1.27
ACCURACY	X = 1.02C - 0.38	X = 1.20C - 0.44	X = 1.07C - 0.70	X = 1.01C + 3.73

X = MEAN RECOVERY
C = TRUE VALUE FOR THE CONCENTRATION

*Revised regression equations and estimates of accuracy and precision are given in Tables 12 and 13.

TABLE 1-4

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

REGRESSION EQUATIONS FOR ACCURACY AND PRECISION

WATER TYPE	METHYLENE CHLORIDE*	TETRACHLOROETHENE	TOLUENE	TRANS-1,2-DICHLOROETHENE *
APPLICABLE CONC. RANGE	(7.2 - 480.0)	(9.0 - 400.0)	(13.5 - 600.0)	(4.5 - 300.0)
DISTILLED WATER				
SINGLE-ANALYST PRECISION	$SR = 0.19X + 0.76$	$SR = 0.13X - 0.18$	$SR = 0.15X - 0.71$	$SR = 0.16X + 0.03$
OVERALL PRECISION	$S = 0.30X + 4.09$	$S = 0.16X - 0.45$	$S = 0.22X - 1.71$	$S = 0.19X + 0.13$
ACCURACY	$X = 0.81C + 2.31$	$X = 1.06C + 0.60$	$X = 0.98C + 2.03$	$X = 0.98C + 0.30$
TAP WATER				
SINGLE-ANALYST PRECISION	$SR = 0.26X + 5.78$	$SR = 0.23X + 0.04$	$SR = 0.18X + 0.71$	$SR = 0.17X + 0.20$
OVERALL PRECISION	$S = 0.36X + 5.37$	$S = 0.27X - 0.64$	$S = 0.24X - 0.66$	$S = 0.17X + 0.52$
ACCURACY	$X = 0.73C + 5.97$	$X = 0.98C + 0.71$	$X = 0.98C + 2.76$	$X = 1.05C - 0.17$
SURFACE WATER				
SINGLE-ANALYST PRECISION	$SR = 0.16X + 9.45$	$SR = 0.18X - 0.22$	$SR = 0.15X - 0.03$	$SR = 0.16X + 0.10$
OVERALL PRECISION	$S = 0.25X + 7.91$	$S = 0.25X - 1.16$	$S = 0.23X - 1.67$	$S = 0.16X + 0.37$
ACCURACY	$X = 0.80C + 8.57$	$X = 1.02C + 1.54$	$X = 1.00C + 2.25$	$X = 0.98C + 0.26$
INDUSTRIAL EFFLUENT				
SINGLE-ANALYST PRECISION	$SR = 0.30X + 3.54$	$SR = 0.27X + 0.54$	$SR = 0.22X - 0.93$	$SR = 0.21X - 0.09$
OVERALL PRECISION	$S = 0.44X + 1.94$	$S = 0.31X - 0.15$	$S = 0.26X - 1.07$	$S = 0.23X + 0.07$
ACCURACY	$X = 0.71C + 3.15$	$X = 0.87C + 1.62$	$X = 0.92C + 2.63$	$X = 0.96C + 0.02$

X = MEAN RECOVERY
C = TRUE VALUE FOR THE CONCENTRATION

*Revised regression equations and estimates of accuracy and precision are given in Tables 12 and 13.

TABLE 1-5

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

REGRESSION EQUATIONS FOR ACCURACY AND PRECISION

WATER TYPE	TRANS-1,3-DICHLOROPROPENE	TRICHLOROETHENE	TRICHLOROFLUOROMETHANE*	1,1-DICHLOROETHANE*
APPLICABLE CONC. RANGE	(9.4 - 416.0)	(5.4 - 360.0)	(7.2 - 480.0)	(10.8 - 480.0)
DISTILLED WATER				
SINGLE-ANALYST PRECISION	SR = 0.20X - 0.53	SR = 0.13X + 0.36	SR = 0.31X - 1.34	SR = 0.15X - 0.22
OVERALL PRECISION	S = 0.26X - 0.09	S = 0.12X + 0.59	S = 0.36X - 0.48	S = 0.15X + 0.53
ACCURACY	X = 0.80C + 0.22	X = 1.04C + 2.27	X = 0.92C + 0.83	X = 0.98C + 1.09
TAP WATER				
SINGLE-ANALYST PRECISION	SR = 0.13X + 0.94	SR = 0.23X - 0.34	SR = 0.18X + 0.66	SR = 0.16X - 0.21
OVERALL PRECISION	S = 0.25X + 0.23	S = 0.26X - 0.28	S = 0.31X - 0.15	S = 0.14X + 0.82
ACCURACY	X = 0.83C - 0.58	X = 1.03C + 1.65	X = 0.98C + 0.34	X = 1.01C + 0.11
SURFACE WATER				
SINGLE-ANALYST PRECISION	SR = 0.15X + 0.03	SR = 0.14X + 1.05	SR = 0.28X - 0.30	SR = 0.11X + 1.07
OVERALL PRECISION	S = 0.24X + 0.18	S = 0.19X + 0.94	S = 0.31X + 0.02	S = 0.12X + 1.06
ACCURACY	X = 0.89C + 0.69	X = 1.03C + 2.91	X = 0.85C + 0.70	X = 0.99C + 1.13
INDUSTRIAL EFFLUENT				
SINGLE-ANALYST PRECISION	SR = 0.18X - 0.37	SR = 0.22X + 0.75	SR = 0.24X - 1.36	SR = 0.23X - 0.27
OVERALL PRECISION	S = 0.22X - 0.48	S = 0.33X - 0.03	S = 0.28X - 0.56	S = 0.24X + 0.84
ACCURACY	X = 0.82C - 0.08	X = 0.99C + 1.76	X = 1.00C + 0.25	X = 1.04C + 0.39

X = MEAN RECOVERY
C = TRUE VALUE FOR THE CONCENTRATION

*Revised regression equations and estimates of accuracy and precision are given in Tables 12 and 13.

TABLE 1-6

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** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

REGRESSION EQUATIONS FOR ACCURACY AND PRECISION

WATER TYPE	1,1-DICHLOROETHENE*	1,1,1-TRICHLOROETHANE	1,1,2-TRICHLOROETHANE	1,1,2,2-TETRACHLOROETHANE
APPLICABLE CONC. RANGE	(7.2 - 480.0)	(9.0 - 400.0)	(10.8 - 480.0)	(15.0 - 680.0)
DISTILLED WATER				
SINGLE-ANALYST PRECISION	SR = 0.22X + 0.58	SR = 0.12X - 0.15	SR = 0.14X + 0.02	SR = 0.16X + 0.69
OVERALL PRECISION	S = 0.37X + 0.24	S = 0.21X - 0.39	S = 0.18X + 0.00	S = 0.20X + 0.41
ACCURACY	X = 1.01C + 1.43	X = 1.06C + 0.73	X = 0.95C + 1.71	X = 0.93C + 1.76
TAP WATER				
SINGLE-ANALYST PRECISION	SR = 0.16X + 1.73	SR = 0.20X - 0.54	SR = 0.12X + 1.44	SR = 0.16X + 0.30
OVERALL PRECISION	S = 0.23X + 0.60	S = 0.23X - 0.22	S = 0.15X + 0.74	S = 0.25X - 0.83
ACCURACY	X = 0.94C + 2.07	X = 1.11C - 0.53	X = 1.02C + 1.80	X = 0.92C + 0.94
SURFACE WATER				
SINGLE-ANALYST PRECISION	SR = 0.14X + 0.95	SR = 0.23X - 0.27	SR = 0.16X - 0.27	SR = 0.14X + 1.08
OVERALL PRECISION	S = 0.21X + 0.69	S = 0.28X - 0.82	S = 0.21X - 0.84	S = 0.20X + 1.53
ACCURACY	X = 0.95C + 1.38	X = 1.01C + 0.31	X = 1.04C + 1.55	X = 0.99C + 1.45
INDUSTRIAL EFFLUENT				
SINGLE-ANALYST PRECISION	SR = 0.23X - 0.35	SR = 0.18X - 0.81	SR = 0.18X + 0.05	SR = 0.37X - 1.22
OVERALL PRECISION	S = 0.23X + 0.24	S = 0.24X - 0.55	S = 0.23X - 1.06	S = 0.30X + 0.91
ACCURACY	X = 0.84C + 1.57	X = 0.99C + 0.83	X = 1.00C + 1.04	X = 0.87C + 2.09

X = MEAN RECOVERY
C = TRUE VALUE FOR THE CONCENTRATION

*Revised regression equations and estimates of accuracy and precision are given in Tables 12 and 13.

TABLE 1-7

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** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

REGRESSION EQUATIONS FOR ACCURACY AND PRECISION

WATER TYPE	1,2-DICHLOROBENZENE/1,4-D	1,2-DICHLOROETHANE	1,2-DICHLOROPROPANE	1,3-DICHLOROBENZENE
APPLICABLE CONC. RANGE	(16.0 - 780.0)	(9.9 - 440.0)	(13.5 - 600.0)	(7.2 - 480.0)
DISTILLED WATER				
SINGLE-ANALYST PRECISION	SR = 0.22X - 1.45	SR = 0.17X - 0.32	SR = 0.14X - 0.85	SR = 0.14X - 0.48
OVERALL PRECISION	S = 0.30X - 1.20	S = 0.21X - 0.38	S = 0.17X - 0.41	S = 0.18X - 0.82
ACCURACY	X = 0.94C + 4.47	X = 1.02C + 0.45	X = 1.18C + 2.00	X = 1.06C + 1.68
TAP WATER				
SINGLE-ANALYST PRECISION	SR = 0.36X - 2.57	SR = 0.18X - 0.21	SR = 0.10X + 0.95	SR = 0.22X + 3.41
OVERALL PRECISION	S = 0.38X - 1.56	S = 0.17X + 0.14	S = 0.13X + 0.53	S = 0.24X + 2.34
ACCURACY	X = 0.98C + 4.65	X = 1.06C - 0.45	X = 1.16C + 1.70	X = 1.02C + 3.80
SURFACE WATER				
SINGLE-ANALYST PRECISION	SR = 0.25X + 0.85	SR = 0.15X + 1.01	SR = 0.13X - 0.52	SR = 0.15X + 1.44
OVERALL PRECISION	S = 0.30X + 1.48	S = 0.18X + 1.69	S = 0.17X - 0.33	S = 0.16X + 1.72
ACCURACY	X = 0.97C + 6.92	X = 1.01C + 0.97	X = 1.18C + 2.89	X = 1.11C + 1.90
INDUSTRIAL EFFLUENT				
SINGLE-ANALYST PRECISION	SR = 0.25X + 2.55	SR = 0.14X + 0.96	SR = 0.13X + 0.77	SR = 0.15X + 2.01
OVERALL PRECISION	S = 0.29X + 4.32	S = 0.18X + 1.44	S = 0.18X + 0.53	S = 0.17X + 1.83
ACCURACY	X = 0.95C + 5.14	X = 1.01C - 0.28	X = 1.22C - 0.25	X = 1.03C + 1.79

X = MEAN RECOVERY
C = TRUE VALUE FOR THE CONCENTRATION

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TABLE 2. ACCURACY AND PRECISION ESTIMATES (COMPUTED FROM THE REGRESSION EQUATIONS) FOR A PREPARED CONCENTRATION OF 100 µg/L

COMPOUND	DISTILLED WATER			TAP WATER			SURFACE WATER			IND. EFFLUENT		
	%REC	%RSD	%RSD -SA	%REC	%RSD	%RSD -SA	%REC	%RSD	%RSD -SA	%REC	%RSD	%RSD -SA
BENZENE	95	24	24	96	21	20	96	22	14	91	21	13
BROMODICHLOROMETHANE	101	21	16	104	24	18	99	23	18	93	23	23
BROMOFORM	100	21	14	112	34	32	96	27	18	93	34	28
BROMOMETHANE	71	26	26	68	35	28	68	26	24	75	41	37
CARBON TETRACHLORIDE	100	14	11	105	23	22	101	20	17	94	21	20
CHLOROBENZENE	100	24	16	104	22	20	104	26	18	94	34	23
CHLOROETHANE	110	29	25	110	35	30	111	29	23	112	38	32
CHLOROFORM	93	18	16	93	37	23	92	23	22	94	19	14
CHLOROMETHANE	96	49	43	90	45	43	111	45	37	102	60	58
CIS-1,3-DICHLOROPROPENE	123	24	19	121	27	21	116	32	26	120	25	15
DIBROMOCHLOROMETHANE	101	17	17	107	27	23	101	21	20	106	25	18
ETHYL BENZENE	100	24	15	102	23	23	105	21	15	105	28	24
METHYLENE CHLORIDE	83	35	20	79	43	33	89	34	27	74	47	35
TETRACHLOROETHENE	107	16	13	99	26	23	104	24	18	89	31	28
TOLUENE	100	20	14	101	23	19	102	21	15	95	25	21
TRANS-1,2-DICHLOROETHENE	98	19	16	105	17	17	98	16	16	96	23	21
TRANS-1,3-DICHLOROPROPENE	80	26	19	82	25	14	90	24	15	82	21	18
TRICHLOROETHENE	106	13	13	105	26	23	106	20	15	101	33	23
TRICHLOROFLUOROMETHANE	93	35	30	98	31	19	86	31	28	100	27	23
1,1-DICHLOROETHANE	99	16	15	101	15	16	100	13	12	104	25	23
1,1-DICHLOROETHENE	102	37	23	96	24	18	96	22	15	86	23	23
1,1,1-TRICHLOROETHANE	107	21	12	110	23	20	101	27	23	100	23	17
1,1,2-TRICHLOROETHANE	97	18	14	104	16	13	106	20	16	101	22	18
1,1,2,2-TETRACHLOROETHANE	95	20	17	93	24	16	100	22	15	89	31	36
1,2-/1,4-DICHLOROBENZENE	98	29	21	103	36	33	104	31	26	100	33	28
1,2-DICHLOROETHANE	102	21	17	106	17	18	102	20	16	101	19	15
1,2-DICHLOROPROPANE	120	17	13	118	13	11	121	17	13	122	18	14
1,3-DICHLOROBENZENE	108	17	14	106	26	25	113	18	16	105	19	17

SECTION 3

RECOMMENDATIONS

Gaseous compounds, bromomethane, chloromethene and chloroethane should be handled with care. Recoveries and precision may be negatively affected due to inherent difficulties in handling these species and other highly volatile compounds unless extra caution is used at the various stages of sample and standard handling and preparation.

If possible, any hot metallic (active) sites in both the gas chromatograph and the detector should be eliminated. These sites could cause breakdown of some compounds. Bromoform, bromomethane and the dichloropropenes are known to be unstable. Standards should be prepared regularly and stored in a freezer to avoid decomposition of these species.

Special care must be taken in handling samples and blanks to avoid contamination from the laboratory atmosphere. This is especially true for methylene chloride. It is recommended that at least daily checks be made for contamination by the use of appropriate blanks.

Carry-over of the analytes from the analysis of high concentration samples to the next analysis was noted. It is recommended that the purge device be filled with distilled water and purged for 10 minutes after the analysis of samples containing high concentrations of purgeable compounds.

SECTION 4

DESCRIPTION OF STUDY

The design of the interlaboratory study of Method 624 was based on the technique described by W. J. Youden [1]. According to this technique, samples are analyzed in pairs where the concentration of each analyte in the sample pairs is slightly different. The analyst is directed to perform a single analysis and report one value for each sample.

The samples were prepared as concentrates in sealed ampules and shipped to the participating laboratories. Each laboratory was responsible for supplying laboratory pure water, finished drinking water, a surface water, and an industrial effluent water for use in the study (two laboratories, numbers 10 and 16 used water treatment plant effluents which may have had primarily municipal origins). The analyst was required to add an aliquot of each concentrate to a volume of water from each of the four water types and subsequently to analyze the spiked water samples.

Sample pairs for each method were prepared at three concentration levels; low, medium, and high, all of which were within the linear range of the mass spectrometer.

In addition to the sample ampules, an industrial effluent water selected by Radian was furnished to each participating laboratory for analysis. This sample was known to contain a number of the priority pollutants and was judged to be somewhat difficult to analyze. The purpose of the industrial effluent sample was to determine the propensity of the method to produce false positives and false negatives.

After all analyses were completed, the results were subjected to statistical analysis using EPA's IMVS system to determine the precision and accuracy of Method 624.

TEST DESIGN

The following is a summary of the test design used based on Youden's nonreplicate technique for samples.

1. Three Youden pairs of samples were analyzed for each analyte with the deviation from the mean of each pair being at least 5% but not more than 20%. The three pairs were spread over a usable and realistic range such that the lowest pair was somewhat above the minimum detection limit and the upper pair was within the linear range of the method.

2. The spiking samples were supplied as liquid concentrates in organic solvents sealed in glass ampules. Sufficient sample was provided to allow withdrawal of the appropriate amount of solution to spike one water sample from each ampule.

3. Twenty-four volatile organic ampules were provided to each of the 15 laboratories.

4. The concentrates were spiked into laboratory pure water, drinking water, a surface water, and an effluent waste water by the participants prior to analysis. In addition, an industrial effluent sample was supplied to each laboratory by Radian. This sample was analyzed without addition of analyte concentrates.

5. Each of the 15 participating laboratories was furnished with the following materials:

- Four Youden pair ampules of each of three concentration levels for the volatile organics. (A total of 24 spiking sample ampules.)
- Sufficient surrogate standard solution to analyze all samples and blanks.
- A 1 liter sample of an industrial effluent to be analyzed without addition of spiking sample.
- Copies of method 624.
- A questionnaire covering difficulties encountered with the method and suggestions for improvements.
- Data report forms to be completed and returned to Radian.
- A set of instructions detailing the method for spiking the samples and the order in which samples were to be run.

SELECTION OF PARTICIPATING LABORATORIES

Laboratories were invited to submit bids to participate in the study through announcements placed in Commerce Business Daily, Analytical Chemistry, and Environmental Science and Technology. Approximately 80 responses were received. Of these respondents, 34 cost bids were obtained from which 15 laboratories were selected. Selection was based on the experience, qualifications, facilities, quality control plans, and cost estimates received from the laboratories. Final selection was also dependent on the laboratories successfully analyzing the performance evaluation samples prepared by Radian.

The laboratories selected for participation are given in Table 3. The laboratories numbers used in the report do not reflect this order.

PREPARATION OF YOUDEN PAIR CONCENTRATES

The Youden pair solutions for the volatile organics were prepared by accurately weighing the pure standard compounds into volumetric flasks and dissolving in acetone. The pure materials were obtained from EPA's Repository for Toxic and Hazardous Materials which was maintained by Radian.

Several stock solutions were prepared for each class of compounds. Each compound was weighed only once. A portion of each stock solution was then diluted by addition of fresh solvent. The diluted and undiluted stock solutions were aliquoted and further diluted to give various concentrations of the individual analytes in each Youden pair.

The surrogate standards and prestudy test sample solutions were prepared by dissolving weighed standards into volumetric flasks and diluting to volume with acetone.

TABLE 3. FIFTEEN LABORATORIES SELECTED FOR PARTICIPATION IN THE METHOD 624 INTERLABORATORY STUDY

Laboratory
Acurex Corporation
California Analytical Laboratories, Inc.
Envirodyne
Environmental Research Group, Inc.
Environmental Science and Engineering, Inc.
Foremost-McKesson
GCA Corporation
Mead CompuChem
Pedco
Rockwell International
Rocky Mountain Analytical
Spectrix
Stewart Labs
The University of Utah Research Institute
West Coast Technical Service, Inc.

When diluted with water according to instructions, the calculated concentrations of the various analytes in the diluted samples in µg/L are given in Tables 4 through 6. These values are based on the weighed amounts of the individual analytes.

Solutions which were prepared from gaseous compounds were obtained by bubbling the pure gas from cylinders into tared volumetric flasks partially filled with methanol. The gas was conducted into the flask through Teflon tubing connected to a Pasteur pipet. After additions of the appropriate amount of gas, the flask was reweighed and the added weight of standard compound obtained by difference.

The diluted spiking solutions were subsequently filled and sealed in glass ampules under nitrogen.

VERITY, HOMOGENEITY, AND STABILITY OF PREPARED AMPULES

For the verity study and homogeneity study, Radian analyzed three ampules in duplicate for each of the six concentrations. These ampules were collected early, middle and late during the filling and sealing operation. For the stability study, only one concentration of the middle Youden Pair was examined by Radian at both 45 and 90 days. Examination of the data indicated that further analyses were necessary. At this time, the Quality Assurance Branch, EMSL-Cincinnati, analyzed the samples. In general, according to EMSL-Cincinnati, the studies indicated that the true values were correct and that the ampules were homogeneous and stable. Exceptions did occur. For details see the section entitled Revised Equations.

PROOF OF FEASIBILITY OF THE STUDY PLAN

To prove the feasibility of the mixture of analytes in the ampules, Radian analyzed the Youden pairs by spiking them into

TABLE 4. CONCENTRATION OF ANALYZED VOLATILE ORGANIC SOLUTIONS

	Youden Pair					
	High (Pair 1)		Medium (Pair 2)		Low (Pair 3)	
Compound	1	2	1	2	1	2
Bromodichloromethane	432	480	120	114	8.0	9.2
Bromoform	400	360	95	100	9.0	10
Bromomethane	546	607	152	144	10.1	9.1
Chloroethane	447	488	122	116	8.1	7.3
2-Chloroethyl Vinyl Ether*	480	432	114	120	10.8	12
Chloromethane	422	469	117	111	7.8	7.0
Dibromochloromethane	360	324	86	90	8.1	9.0
1,1-Dichloroethene	432	480	120	114	8.0	7.2
1,1-Dichloroethane	480	432	114	120	10.8	12
1,2-Dichloroethane	440	396	104	110	9.9	11
1,2-Dichloropropane	600	540	142	150	13.5	15
cis-1,3-Dichloropropene	357	321	85	89	8.0	8.9
trans-1,3-Dichloropropene	416	374	99	104	9.4	10.4
Ethyl Benzene	680	612	162	170	15	17
Methylene Chloride	432	480	120	114	8.0	7.2
1,1,2,2-Tetrachloroethane	680	612	162	170	15	17
Tetrachloroethene	400	360	95	100	9.0	10
1,1,1-Trichloroethane	400	360	95	100	9.0	10
1,1,2-Trichloroethane	480	432	114	120	10.8	12
Trichloroethene	324	360	90	86	6.0	5.4
1,2-Dichlorobenzene**	378	420	105	100	7.0	6.3
1,3-Dichlorobenzene	432	480	120	114	8.0	7.2
1,4-Dichlorobenzene**	400	360	95	100	9.0	10
Trichlorofluoromethane	432	480	120	114	8.0	7.2
Benzene	480	432	114	120	10.8	12
Carbon Tetrachloride	400	360	95	100	9.0	10
Chlorobenzene	600	540	142	150	13.5	15
Chloroform	270	300	75	71	5.0	4.5
Trans-1,2-Dichloroethene	270	300	75	71	5.0	4.5
Toluene	600	540	142	150	13.5	15

*Decomposed in the solution mixture

**Spiking concentrations were summed - compounds co-eluted from the GC column.

TABLE 5. SPIKING CONCENTRATION OF SURROGATE COMPOUNDS

Compound	Prepared Concentration - µg/mℓ
Method 624	
1,2-dichlorobenzene-d_4	150
1,4-dichlorobutane-d_8	151
2-Bromo-1-chloropropane-d_6	150
Bromochloromethane-d_2	151
Fluorobenzene	150
4-Bromofluorobenzene	152

TABLE 6. PERFORMANCE SAMPLE FOR METHOD 624

Compound	Concentration, µg/L
1,1,1-Trichloroethane	23.7
1,1-Dichloroethane	27.2
1,1,2-Trichloroethane	37.2
2-Chloroethyl vinyl ether	34.4
1,2-Dichlorobenzene	15.0
Ethyl benzene	18.3
Chlorodibromomethane	7.0
Carbontetrachloride	5.2
Acetone*	25.3
Chloroethane	28.3

*Nonpriority pollutant interference

laboratory pure water and performing the analyses according to the instructions provided to the participants. The results of Radian's analyses are presented and discussed in Appendix B.

SECTION 5

STATISTICAL TREATMENT OF DATA

Data obtained from the interlaboratory method validation study were subjected to statistical analyses employing US EPA's IMVS system [2] of computer programs. This system of programs was designed to implement ASTM procedure D2777, "Standard Practice for Determination of Precision and Bias of Methods of Committee D-19 on Water" [3]. The analyses conducted using the IMVS programs included tests for the rejection of outliers (whole laboratories for a water-type and individual data points), estimation of mean recovery (accuracy), estimation of single-analyst and overall precision, and tests for the effects of water test on accuracy and precision.

Prior to employing the IMVS system, the interlaboratory method study data was reduced to a standard form and validated. Tables C-1 through C-84 in Appendix C present the standardized data from the 15 participating laboratories. All values shown in the tables have been corrected for the blank values presented in Tables C-85 through C-88. Corrected values less than zero and values reported as "not detected" or "detected, but the concentration could not be quantitated" are shown as zero. Asterisked values were rejected as outliers using the various IMVS software tests presented in the next section.

Prior to formal analysis by the IMVS software, data were screened for incorrectly transcribed data values through the use of descriptive statistics, graphical aids and visual scanning of the data base.

REJECTION OF OUTLIERS

An outlying observation, or "outlier," is a data point that appears to deviate markedly from other members of the group of values with which it is associated. Outlying data points are often encountered during interlaboratory test programs; if they are not removed, they can result in a distortion of the accuracy and precision statistics which characterize the analytical method. These outlying points should not be removed indiscriminantly, however, because they may represent an extreme manifestation of the random variability inherent in the method.

ASTM procedure E178-80, "Standard Practice for Dealing with Outlying Observations" [4] and ASTM procedure D2777-77 [3] present explicit statistical rules and methods for identification of outliers. The IMVS software [2] was used to screen the concentration data for outliers.

Data from outlying laboratories for a particular type were rejected employing Youden's laboratory ranking test procedure [3, 5] at the 5% level of significance. Data remaining after the laboratory ranking procedure were subjected to individual outlier tests. After all zero, missing, "detected, but could not be quantitated" and "nondetect" data were rejected as outliers, the remaining data were examined using the two-sided outlier rejection T-test constructed by Thompson [6]. All data rejected as outliers for this study are identified by an asterisk in the tables of data (Tables C-1 to C-84, Appendix C). Of the 9,880 reported concentrations, 1,434 were deleted as outliers (approximately 15%).

Youden's Laboratory Ranking Procedure

Using the data for each water type, Youden's laboratory ranking test [3, 5] was performed at the 5% level of significance. The

Youden laboratory ranking procedure requires a complete set of data from each laboratory within each water type, so that, missing data had to be replaced. The natural logarithms of the recovery data were regressed against the natural logarithms of the spiked ampule concentrations to find the line of best fit. The predicted log-recovery measurements were computed from the least-squares regression equation, and the missing values were estimated by taking the exponential of the predicted value. (For complete details of this procedure, see Reference 2.)

With a complete set of data, the laboratory ranking test was used to identify laboratories (for a particular water type) that were so consistently high or low that their results are unrepresentative of the method's capabilities.

Data from outlying laboratories were rejected at the 5% level of significance. When a laboratory was rejected, all the lab's data for that water type were flagged as outliers for further analyses. After ranking was complete, all estimated "missing values" were deleted from any further analyses.

Test for Individual Outliers

The data remaining after rejection of all zero, missing, "detected, but could not be quantitated" and "nondetect" data were subjected to an individual outlier test based on calculation of the T-value [3, 6].

In these calculations the mean recovery, $\overline{X}$, is given by

$$\overline{X} = \frac{1}{n} \sum_{i=1}^{n} X_i \qquad (1)$$

and the standard deviations, s, is given by

$$s = \sqrt{\frac{1}{n-1} \sum_{i=1}^{n} (X_i - \overline{X})^2} \qquad (2)$$

where X_i = individual analyses

n = number of retained analyses values in the ampule set

The outliers may be rejected if the value of T_i defined by

$$T_i = \frac{X_e - \overline{X}}{s} \qquad (3)$$

exceeds the critical value of the Thompson's T (two-sided at 5% significance level). In the equation, X_e represents the value farthest away from the mean $\overline{X}$ of this set of retained data. If the extreme value is rejected as an outlier, the test is repeated until the value being tested passes the test.

STATISTICAL SUMMARIES

After the outlier rejection tests were performed, the following summary statistics were calculated employing the remaining data for each ampule (single analyte, single concentration, single water matrix):

- Number of retained data points, n
- Mean recovery of retained data, $\overline{X}$
- Accuracy as a percent of relative error, % R.E.
- Overall absolute standard deviation, S
- Percent relative overall standard deviation, % RSD

- Absolute single-analyst standard deviation, S_r
- Percent relative standard deviation for a single analyst, % RSD-SA

All of these statistics, except the single-analyst absolute and relative standard deviations, were calculated using the retained data for each ampule. The basic statistical formulas used for these calculations are given below, where $X_1, X_2, \ldots, X_n$ denote the values for the n retained data points for a given ampule.

Mean Recovery ($\overline{X}$):

$$\overline{X} = \frac{1}{n} \sum_{i=1}^{n} X_i \qquad (1)$$

Accuracy as % Relative Error:

$$\% \text{ RE} = \frac{\overline{X} - \text{true value}}{\text{true value}} \times 100 \qquad (4)$$

Overall Standard Deviation:

$$S = \sqrt{\frac{1}{n-1} \sum_{i=1}^{n} (X_i - \overline{X})^2} \qquad (2)$$

and

Percent Relative Overall Standard Deviation:

$$\% \text{ RSD} = \frac{S}{\overline{X}} \times 100 \qquad (5)$$

The overall standard deviation, S, indicates the precision associated with measurements generated by a group of laboratories. This represents the broad variation in the data collected in a collaborative study. A measure of how well an individual laboratory can expect to perform in his own laboratory is another important measure of precision. This "single-analyst" precision, denoted by S_r, is measured by

$$S_r = \sqrt{\frac{1}{2(m-1)} \sum_{i=1}^{m} (D_i - \overline{D})^2} \qquad (6)$$

where m = number of retained Youden-paired observations

D_i = difference between observations in the i^{th} pair

$\overline{D}$ = average of D_i values

The Youden-pair design employed in this study permits the calculation of this single-analyst precision without making duplicate measurements on the same sample. This helps to avoid the well-intentioned manipulation of data that can occur when laboratories make duplicate analyses.

The percent relative standard deviation for the single-analyst precision is calculated by

$$\%\ \text{RSD-SA} = \frac{S_r}{\overline{X}^*} \times 100 \qquad (7)$$

where $\overline{X}^*$ is the average of the two mean recoveries corresponding to the two ampules defining the particular Youden pair. These summary statistics are presented in Tables 7-1 through 7-28 for each of the 28 Method 624 compounds in the four water matrices.

TABLE 7-1

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ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

STATISTICAL SUMMARY FOR BENZENE ANALYSES BY WATER TYPE

	WATER 1		WATER 2		WATER 3		WATER 4	
LOW YOUDEN PAIR	1	2	1	2	1	2	1	2
NUMBER OF DATA POINTS	11	12	12	11	13	14	11	11
TRUE CONC (C) UG/L	10.8	12.0	10.8	12.0	10.8	12.0	10.8	12.0
MEAN RECOVERY (X)	11.6	13.5	11.7	12.7	11.9	13.1	10.8	12.6
ACCURACY(%REL ERROR)	7.49	12.36	8.56	5.83	10.29	8.96	0.13	5.70
OVERALL STD DEV (S)	1.6	2.2	2.0	1.9	1.8	2.0	1.7	1.6
OVERALL REL STD DEV, %	13.37	16.11	16.96	14.74	15.48	15.39	16.12	12.53
SINGLE STD DEV, (SR)	1.5		2.1		1.3		0.8	
ANALYST REL DEV, %	11.80		17.42		10.39		6.44	
MEDIUM YOUDEN PAIR	3	4	3	4	3	4	3	4
NUMBER OF DATA POINTS	13	12	12	13	13	14	13	12
TRUE CONC (C) UG/L	114.0	120.0	114.0	120.0	114.0	120.0	114.0	120.0
MEAN RECOVERY (X)	119.0	120.1	117.9	120.2	117.8	126.4	111.3	121.8
ACCURACY(%REL ERROR)	4.38	0.07	3.41	0.19	3.31	5.37	-2.37	1.48
OVERALL STD DEV (S)	38.1	20.3	24.6	19.2	23.3	18.6	21.5	32.3
OVERALL REL STD DEV, %	32.00	16.87	20.90	16.01	19.79	14.74	19.32	26.55
SINGLE STD DEV, (SR)	32.6		25.1		9.0		19.0	
ANALYST REL DEV, %	27.21		21.08		7.35		16.33	
HIGH YOUDEN PAIR	5	6	5	6	5	6	5	6
NUMBER OF DATA POINTS	13	13	13	13	14	14	13	12
TRUE CONC (C) UG/L	480.0	432.0	480.0	432.0	480.0	432.0	480.0	432.0
MEAN RECOVERY (X)	437.0	347.1	408.8	416.3	399.0	382.3	403.0	331.5
ACCURACY(%REL ERROR)	-8.95	-19.64	-14.84	-3.63	-16.87	-11.50	-16.05	-23.26
OVERALL STD DEV (S)	106.8	87.7	86.1	114.3	132.4	86.1	86.5	64.4
OVERALL REL STD DEV, %	24.44	25.25	21.06	27.45	33.18	22.52	21.45	19.43
SINGLE STD DEV, (SR)	89.1		73.7		81.8		42.7	
ANALYST REL DEV, %	22.72		17.86		20.96		11.64	

WATER LEGEND

1 - DISTILLED WATER
2 - TAP WATER
3 - SURFACE WATER
4 - INDUSTRIAL EFFLUENT

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TABLE 7-2

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

STATISTICAL SUMMARY FOR BROMODICHLOROMETHANE ANALYSES BY WATER TYPE

	WATER 1		WATER 2		WATER 3		WATER 4	
LOW YOUDEN PAIR	1	2	1	2	1	2	1	2
NUMBER OF DATA POINTS	13	15	12	14	15	15	13	14
TRUE CONC (C) UG/L	8.0	9.2	8.0	9.2	8.0	9.2	8.0	9.2
MEAN RECOVERY (X)	7.2	7.3	9.6	11.0	8.1	6.6	7.3	6.9
ACCURACY(%REL ERROR)	-10.48	-20.87	20.00	19.57	1.50	-28.19	-8.89	-25.00
OVERALL STD DEV (S)	2.8	2.3	6.4	5.0	2.9	2.1	2.1	3.1
OVERALL REL STD DEV, %	39.22	31.72	66.67	45.72	34.78	32.40	28.39	44.43
SINGLE STD DEV, (SR)	1.7		2.7		1.7		1.5	
ANALYST REL DEV, %	23.17		26.25		23.44		20.86	
MEDIUM YOUDEN PAIR	3	4	3	4	3	4	3	4
NUMBER OF DATA POINTS	13	14	13	14	15	15	13	13
TRUE CONC (C) UG/L	120.0	114.0	120.0	114.0	120.0	114.0	120.0	114.0
MEAN RECOVERY (X)	140.5	100.7	132.2	94.6	131.1	103.3	116.0	99.2
ACCURACY(%REL ERROR)	17.08	-11.67	10.16	-17.03	9.25	-9.36	-3.35	-12.94
OVERALL STD DEV (S)	12.4	23.9	29.5	22.4	27.0	25.6	24.1	28.3
OVERALL REL STD DEV, %	8.82	23.78	22.28	23.64	20.60	24.81	20.80	28.48
SINGLE STD DEV, (SR)	17.4		26.8		25.4		26.9	
ANALYST REL DEV, %	14.39		23.61		21.64		25.02	
HIGH YOUDEN PAIR	5	6	5	6	5	6	5	6
NUMBER OF DATA POINTS	15	15	14	14	15	15	13	14
TRUE CONC (C) UG/L	432.0	480.0	432.0	480.0	432.0	480.0	432.0	480.0
MEAN RECOVERY (X)	462.0	472.3	478.8	535.5	419.5	490.6	399.6	482.3
ACCURACY(%REL ERROR)	6.95	-1.60	10.83	11.57	-2.90	2.20	-7.49	0.48
OVERALL STD DEV (S)	125.9	99.4	107.3	113.4	111.9	92.4	70.4	125.4
OVERALL REL STD DEV, %	27.25	21.04	22.40	21.18	26.67	18.82	17.61	25.99
SINGLE STD DEV, (SR)	74.8		64.8		65.7		92.4	
ANALYST REL DEV, %	16.00		12.78		14.44		20.96	

WATER LEGEND

1 - DISTILLED WATER
2 - TAP WATER
3 - SURFACE WATER
4 - INDUSTRIAL EFFLUENT

TABLE 7-3

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

STATISTICAL SUMMARY FOR BROMOFORM ANALYSES BY WATER TYPE

	WATER 1		WATER 2		WATER 3		WATER 4	
LOW YOUDEN PAIR	1	2	1	2	1	2	1	2
NUMBER OF DATA POINTS	12	13	12	13	14	14	13	15
TRUE CONC (C) UG/L	9.0	10.0	9.0	10.0	9.0	10.0	9.0	10.0
MEAN RECOVERY (X)	8.3	9.4	7.7	12.3	8.2	9.0	6.9	8.0
ACCURACY(%REL ERROR)	-7.41	-6.23	-14.35	22.92	-8.73	-10.36	-23.33	-19.53
OVERALL STD DEV (S)	2.4	3.5	2.9	6.7	3.0	3.3	2.2	3.8
OVERALL REL STD DEV, %	28.77	37.42	37.79	54.52	36.17	37.28	31.58	47.67
SINGLE STD DEV, (SR)	1.4		4.4		1.6		2.0	
ANALYST REL DEV, %	15.67		44.09		18.37		26.44	
MEDIUM YOUDEN PAIR	3	4	3	4	3	4	3	4
NUMBER OF DATA POINTS	13	12	13	14	15	15	15	14
TRUE CONC (C) UG/L	95.0	100.0	95.0	100.0	95.0	100.0	95.0	100.0
MEAN RECOVERY (X)	108.4	50.5	118.1	54.4	104.7	56.9	91.3	58.8
ACCURACY(%REL ERROR)	14.06	-49.48	24.34	-45.63	10.19	-43.09	-3.92	-41.16
OVERALL STD DEV (S)	13.6	16.4	47.3	18.9	24.3	18.4	19.4	35.5
OVERALL REL STD DEV, %	12.56	32.43	40.04	34.70	23.18	32.31	21.23	60.41
SINGLE STD DEV, (SR)	12.5		35.8		18.0		28.5	
ANALYST REL DEV, %	15.76		41.50		22.34		37.95	
HIGH YOUDEN PAIR	5	6	5	6	5	6	5	6
NUMBER OF DATA POINTS	13	14	14	14	13	15	15	13
TRUE CONC (C) UG/L	400.0	360.0	400.0	360.0	400.0	360.0	400.0	360.0
MEAN RECOVERY (X)	449.7	444.6	537.1	472.1	409.9	410.9	440.1	387.5
ACCURACY(%REL ERROR)	12.42	23.50	34.27	31.14	2.48	14.14	10.04	7.64
OVERALL STD DEV (S)	74.5	100.4	151.0	129.3	99.5	105.9	130.0	95.2
OVERALL REL STD DEV, %	16.57	22.58	28.12	27.38	24.27	25.77	29.53	24.56
SINGLE STD DEV, (SR)	53.8		120.3		58.6		75.0	
ANALYST REL DEV, %	12.04		23.85		14.28		18.12	

WATER LEGEND

1 - DISTILLED WATER
2 - TAP WATER
3 - SURFACE WATER
4 - INDUSTRIAL EFFLUENT

TABLE 7-4

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

STATISTICAL SUMMARY FOR BROMOMETHANE ANALYSES BY WATER TYPE

	WATER 1		WATER 2		WATER 3		WATER 4	
LOW YOUDEN PAIR	1	2	1	2	1	2	1	2
NUMBER OF DATA POINTS	12	11	11	11	12	13	12	11
TRUE CONC (C) UG/L	10.1	9.1	10.1	9.1	10.1	9.1	10.1	9.1
MEAN RECOVERY (X)	6.3	6.0	5.5	5.5	6.3	5.8	5.9	6.9
ACCURACY(%REL ERROR)	-38.04	-34.27	-45.99	-39.66	-37.46	-35.93	-41.63	-24.03
OVERALL STD DEV (S)	1.9	2.4	2.7	2.3	1.9	2.5	2.0	3.1
OVERALL REL STD DEV, %	30.62	40.36	48.97	41.04	29.49	42.63	34.60	44.29
SINGLE STD DEV, (SR)	1.1		1.2		1.3		2.1	
ANALYST REL DEV, %	18.58		21.14		20.92		33.20	
MEDIUM YOUDEN PAIR	3	4	3	4	3	4	3	4
NUMBER OF DATA POINTS	13	13	11	12	13	12	11	14
TRUE CONC (C) UG/L	152.0	144.0	152.0	144.0	152.0	144.0	152.0	144.0
MEAN RECOVERY (X)	117.7	73.4	100.2	73.7	101.5	94.3	98.9	126.0
ACCURACY(%REL ERROR)	-22.54	-49.06	-34.09	-48.83	-33.20	-34.54	-34.92	-12.52
OVERALL STD DEV (S)	30.9	15.5	31.2	17.7	32.7	21.6	28.3	98.8
OVERALL REL STD DEV, %	26.25	21.18	31.15	24.04	32.18	22.94	28.60	78.42
SINGLE STD DEV, (SR)	26.5		26.5		25.5		53.8	
ANALYST REL DEV, %	27.73		30.47		26.02		47.84	
HIGH YOUDEN PAIR	5	6	5	6	5	6	5	6
NUMBER OF DATA POINTS	13	13	12	12	11	13	14	11
TRUE CONC (C) UG/L	546.0	607.0	546.0	607.0	546.0	607.0	546.0	607.0
MEAN RECOVERY (X)	410.1	498.6	404.9	494.8	354.1	463.0	424.6	444.6
ACCURACY(%REL ERROR)	-24.89	-17.86	-25.84	-18.49	-35.14	-23.72	-22.23	-26.75
OVERALL STD DEV (S)	87.5	162.3	148.8	224.5	64.5	140.6	112.9	126.5
OVERALL REL STD DEV, %	21.33	32.55	36.75	45.38	18.22	30.36	26.58	28.44
SINGLE STD DEV, (SR)	114.6		125.1		85.9		114.9	
ANALYST REL DEV, %	25.22		27.80		21.03		26.45	

WATER LEGEND

1 - DISTILLED WATER
2 - TAP WATER
3 - SURFACE WATER
4 - INDUSTRIAL EFFLUENT

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TABLE 7-5

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

STATISTICAL SUMMARY FOR CARBON TETRACHLORIDE ANALYSES BY WATER TYPE

	WATER 1		WATER 2		WATER 3		WATER 4	
LOW YOUDEN PAIR	1	2	1	2	1	2	1	2
NUMBER OF DATA POINTS	12	10	11	10	14	14	14	14
TRUE CONC (C) UG/L	9.0	10.0	9.0	10.0	9.0	10.0	9.0	10.0
MEAN RECOVERY (X)	8.0	9.6	8.2	8.9	8.6	10.2	7.8	9.1
ACCURACY(%REL ERROR)	-10.83	-4.10	-8.89	-10.60	-4.80	1.93	-13.81	-8.57
OVERALL STD DEV (S)	1.8	0.7	1.4	0.7	2.9	2.3	2.1	2.3
OVERALL REL STD DEV, %	22.32	6.99	17.58	8.00	34.39	22.18	27.56	25.42
SINGLE STD DEV, (SR)	1.3		1.0		2.5		1.4	
ANALYST REL DEV, %	14.95		12.21		26.52		16.69	
MEDIUM YOUDEN PAIR	3	4	3	4	3	4	3	4
NUMBER OF DATA POINTS	11	11	11	12	14	14	13	14
TRUE CONC (C) UG/L	95.0	100.0	95.0	100.0	95.0	100.0	95.0	100.0
MEAN RECOVERY (X)	107.6	71.3	114.8	72.0	108.2	81.9	91.6	78.4
ACCURACY(%REL ERROR)	13.28	-28.74	20.85	-27.98	13.93	-18.13	-3.61	-21.55
OVERALL STD DEV (S)	7.6	15.0	28.3	25.5	20.0	17.8	16.1	19.2
OVERALL REL STD DEV, %	7.05	21.12	24.62	35.35	18.44	21.79	17.53	24.48
SINGLE STD DEV, (SR)	9.0		24.9		17.3		17.5	
ANALYST REL DEV, %	10.09		26.66		18.24		20.59	
HIGH YOUDEN PAIR	5	6	5	6	5	6	5	6
NUMBER OF DATA POINTS	10	12	12	12	13	14	13	12
TRUE CONC (C) UG/L	400.0	360.0	400.0	360.0	400.0	360.0	400.0	360.0
MEAN RECOVERY (X)	437.6	379.2	444.9	431.1	396.9	381.6	381.2	382.5
ACCURACY(%REL ERROR)	9.39	5.34	11.22	19.76	-0.77	6.00	-4.71	6.25
OVERALL STD DEV (S)	47.1	66.4	73.0	80.4	47.7	98.8	70.3	84.1
OVERALL REL STD DEV, %	10.76	17.50	16.42	18.66	12.02	25.90	18.45	22.00
SINGLE STD DEV, (SR)	49.0		77.6		60.4		73.9	
ANALYST REL DEV, %	12.00		17.71		15.51		19.36	

WATER LEGEND

1 - DISTILLED WATER
2 - TAP WATER
3 - SURFACE WATER
4 - INDUSTRIAL EFFLUENT

TABLE 7-6

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                 ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
                         OFFICE OF RESEARCH AND DEVELOPMENT
                          ENVIRONMENTAL PROTECTION AGENCY

                ** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

                 STATISTICAL SUMMARY FOR CHLOROBENZENE ANALYSES BY WATER TYPE

                             WATER  1           WATER  2           WATER  3           WATER  4
-------------------------------------------------------------------------------------------------------------
LOW YOUDEN PAIR              1        2         1        2         1        2         1        2
NUMBER OF DATA POINTS       14       14        12       12        14       12        15       15
TRUE CONC (C) UG/L        13.5     15.0      13.5     15.0      13.5     15.0      13.5     15.0
MEAN RECOVERY (X)         15.5     16.7      15.8     17.4      16.5     18.0      14.7     16.2
ACCURACY(%REL ERROR)     14.81    11.62     16.79    16.22     22.12    20.14      8.94     8.09
OVERALL STD DEV (S)        2.0      2.6       2.4      4.6       3.0      1.7       3.7      2.8
OVERALL REL STD DEV, %   12.87    15.69     15.48    26.33     17.96     9.69     25.42    17.53

SINGLE    STD DEV, (SR)        2.6                3.8                2.5                3.6
ANALYST   REL DEV, %         15.97              22.63              14.56              23.61
-------------------------------------------------------------------------------------------------------------
MEDIUM YOUDEN PAIR           3        4         3        4         3        4         3        4
NUMBER OF DATA POINTS       14       13        12       13        14       13        15       15
TRUE CONC (C) UG/L       142.0    150.0     142.0    150.0     142.0    150.0     142.0    150.0
MEAN RECOVERY (X)        152.7    160.2     143.0    162.4     165.6    162.8     136.3    153.8
ACCURACY(%REL ERROR)      7.56     6.82      0.70     8.30     16.63     8.52     -4.05     2.53
OVERALL STD DEV (S)       34.8     33.5      42.5     22.9      31.9     29.6      41.0     48.9
OVERALL REL STD DEV, %   22.80    20.94     29.71    14.08     19.27    18.17     30.06    31.81

SINGLE    STD DEV, (SR)       15.1               30.8               22.6               35.2
ANALYST   REL DEV, %          9.67              20.17              13.77              24.31
-------------------------------------------------------------------------------------------------------------
HIGH YOUDEN PAIR             5        6         5        6         5        6         5        6
NUMBER OF DATA POINTS       14       13        12       13        14       14        15       15
TRUE CONC (C) UG/L       600.0    540.0     600.0    540.0     600.0    540.0     600.0    540.0
MEAN RECOVERY (X)        550.2    487.0     520.3    630.7     508.1    551.2     520.7    478.8
ACCURACY(%REL ERROR)     -8.30    -9.81    -13.29    16.80    -15.32     2.07    -13.22   -11.33
OVERALL STD DEV (S)      184.6    111.4     124.0    133.7     207.1    171.1     224.9    161.4
OVERALL REL STD DEV, %   33.55    22.88     23.83    21.20     40.75    31.05     43.19    33.71

SINGLE    STD DEV, (SR)      113.5              101.5              121.9              108.4
ANALYST   REL DEV, %         21.89              17.64              23.02              21.68

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WATER LEGEND
------------
 1 - DISTILLED WATER
 2 - TAP WATER
 3 - SURFACE WATER
 4 - INDUSTRIAL EFFLUENT
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TABLE 7-7

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

STATISTICAL SUMMARY FOR CHLOROETHANE ANALYSES BY WATER TYPE

	WATER 1		WATER 2		WATER 3		WATER 4	
LOW YOUDEN PAIR	1	2	1	2	1	2	1	2
NUMBER OF DATA POINTS	14	14	13	13	14	13	13	15
TRUE CONC (C) UG/L	8.1	7.3	8.1	7.3	8.1	7.3	8.1	7.3
MEAN RECOVERY (X)	10.6	9.2	9.9	7.5	9.9	10.5	8.2	9.8
ACCURACY(%REL ERROR)	30.51	26.22	22.70	2.95	21.78	43.99	1.66	33.88
OVERALL STD DEV (S)	5.3	4.0	2.9	3.0	3.6	5.2	2.1	4.7
OVERALL REL STD DEV, %	49.97	43.87	29.47	39.25	36.67	49.46	25.62	48.33
SINGLE STD DEV, (SR)	4.2		2.0		3.9		3.1	
ANALYST REL DEV, %	42.58		22.91		37.84		34.96	
MEDIUM YOUDEN PAIR	3	4	3	4	3	4	3	4
NUMBER OF DATA POINTS	14	13	14	15	13	14	15	13
TRUE CONC (C) UG/L	122.0	116.0	122.0	116.0	122.0	116.0	122.0	116.0
MEAN RECOVERY (X)	146.3	93.2	144.8	104.9	136.2	118.4	160.4	90.0
ACCURACY(%REL ERROR)	19.91	-19.66	18.68	-9.55	11.63	2.06	31.48	-22.45
OVERALL STD DEV (S)	53.7	20.9	43.9	38.8	29.6	34.6	69.1	27.5
OVERALL REL STD DEV, %	36.68	22.45	30.33	37.00	21.75	29.22	43.10	30.55
SINGLE STD DEV, (SR)	39.9		41.1		25.0		41.3	
ANALYST REL DEV, %	33.32		32.89		19.65		33.01	
HIGH YOUDEN PAIR	5	6	5	6	5	6	5	6
NUMBER OF DATA POINTS	14	13	15	14	14	14	15	14
TRUE CONC (C) UG/L	447.0	488.0	447.0	488.0	447.0	488.0	447.0	488.0
MEAN RECOVERY (X)	522.4	572.2	507.9	570.8	476.3	592.9	526.9	608.1
ACCURACY(%REL ERROR)	16.86	17.25	13.61	16.97	6.55	21.50	17.87	24.62
OVERALL STD DEV (S)	128.3	152.8	197.4	191.4	151.0	189.3	175.6	251.8
OVERALL REL STD DEV, %	24.56	26.70	38.86	33.52	31.71	31.92	33.32	41.41
SINGLE STD DEV, (SR)	81.4		155.5		134.1		179.8	
ANALYST REL DEV, %	14.88		28.84		25.08		31.68	

WATER LEGEND

1 - DISTILLED WATER
2 - TAP WATER
3 - SURFACE WATER
4 - INDUSTRIAL EFFLUENT

TABLE 7-8

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

STATISTICAL SUMMARY FOR CHLOROFORM ANALYSES BY WATER TYPE

	WATER 1		WATER 2		WATER 3		WATER 4	
LOW YOUDEN PAIR	1	2	1	2	1	2	1	2
NUMBER OF DATA POINTS	14	13	8	11	13	11	11	11
TRUE CONC (C) UG/L	5.0	4.5	5.0	4.5	5.0	4.5	5.0	4.5
MEAN RECOVERY (X)	5.1	4.4	11.5	8.6	5.2	4.8	5.1	4.6
ACCURACY(%REL ERROR)	2.14	-2.39	130.00	90.91	3.38	6.77	1.45	1.92
OVERALL STD DEV (S)	1.2	0.8	9.7	7.9	1.4	0.8	1.7	1.4
OVERALL REL STD DEV, %	23.30	18.81	84.28	92.39	26.52	16.35	32.77	30.61
SINGLE STD DEV, (SR)	1.0		2.7		0.8		1.0	
ANALYST REL DEV, %	20.17		26.62		16.16		20.81	
MEDIUM YOUDEN PAIR	3	4	3	4	3	4	3	4
NUMBER OF DATA POINTS	14	13	12	13	14	14	12	12
TRUE CONC (C) UG/L	75.0	71.0	75.0	71.0	75.0	71.0	75.0	71.0
MEAN RECOVERY (X)	71.9	61.5	73.8	57.9	77.1	59.7	72.1	59.9
ACCURACY(%REL ERROR)	-4.10	-13.33	-1.61	-18.41	2.85	-15.93	-3.80	-15.59
OVERALL STD DEV (S)	11.1	15.3	18.6	26.7	20.0	7.5	10.3	17.2
OVERALL REL STD DEV, %	15.46	24.88	25.19	46.11	25.96	12.56	14.21	28.63
SINGLE STD DEV, (SR)	10.9		21.0		14.6		12.0	
ANALYST REL DEV, %	16.36		31.87		21.36		18.18	
HIGH YOUDEN PAIR	5	6	5	6	5	6	5	6
NUMBER OF DATA POINTS	12	13	12	12	14	14	11	12
TRUE CONC (C) UG/L	270.0	300.0	270.0	300.0	270.0	300.0	270.0	300.0
MEAN RECOVERY (X)	258.9	279.6	254.5	269.7	223.6	295.5	257.8	298.2
ACCURACY(%REL ERROR)	-4.11	-6.79	-5.73	-10.08	-17.20	-1.51	-4.53	-0.61
OVERALL STD DEV (S)	26.3	57.9	88.4	98.9	71.2	55.3	47.8	42.5
OVERALL REL STD DEV, %	10.17	20.70	34.75	36.68	31.84	18.70	18.53	14.25
SINGLE STD DEV, (SR)	41.4		43.7		57.6		30.5	
ANALYST REL DEV, %	15.38		16.67		22.20		18.96	

WATER LEGEND

1 - DISTILLED WATER
2 - TAP WATER
3 - SURFACE WATER
4 - INDUSTRIAL EFFLUENT

TABLE 7-9

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

STATISTICAL SUMMARY FOR CHLOROMETHANE ANALYSES BY WATER TYPE

	WATER 1		WATER 2		WATER 3		WATER 4	
LOW YOUDEN PAIR	1	2	1	2	1	2	1	2
NUMBER OF DATA POINTS	11	11	8	11	11	11	10	11
TRUE CONC (C) UG/L	7.8	7.0	7.8	7.0	7.8	7.0	7.8	7.0
MEAN RECOVERY (X)	7.4	10.9	6.3	7.2	7.4	8.0	8.6	5.9
ACCURACY(%REL ERROR)	-5.59	56.23	-18.75	2.99	-4.78	14.83	10.64	-15.13
OVERALL STD DEV (S)	3.4	9.6	1.4	4.8	3.6	4.6	3.7	2.7
OVERALL REL STD DEV, %	46.63	88.12	22.03	66.63	48.16	57.15	43.07	45.87
SINGLE STD DEV, (SR)	5.5		3.0		2.4		3.0	
ANALYST REL DEV, %	59.95		44.35		31.07		40.52	
MEDIUM YOUDEN PAIR	3	4	3	4	3	4	3	4
NUMBER OF DATA POINTS	13	10	12	11	13	11	12	11
TRUE CONC (C) UG/L	117.0	111.0	117.0	111.0	117.0	111.0	117.0	111.0
MEAN RECOVERY (X)	130.8	80.3	140.9	82.1	161.6	87.8	126.7	73.1
ACCURACY(%REL ERROR)	11.80	-27.63	20.43	-26.01	38.08	-20.93	8.28	-34.13
OVERALL STD DEV (S)	69.0	13.4	73.9	12.7	72.7	27.3	55.0	48.9
OVERALL REL STD DEV, %	52.73	16.64	52.43	15.45	45.03	31.14	43.44	66.85
SINGLE STD DEV, (SR)	49.8		54.0		53.2		55.0	
ANALYST REL DEV, %	47.17		48.38		42.64		55.08	
HIGH YOUDEN PAIR	5	6	5	6	5	6	5	6
NUMBER OF DATA POINTS	13	12	11	12	13	13	13	13
TRUE CONC (C) UG/L	422.0	469.0	422.0	469.0	422.0	469.0	422.0	469.0
MEAN RECOVERY (X)	397.7	504.1	302.4	455.5	548.5	478.5	473.2	544.9
ACCURACY(%REL ERROR)	-5.75	7.49	-28.33	-2.87	29.98	2.03	12.14	16.18
OVERALL STD DEV (S)	225.1	279.2	184.9	213.2	272.5	254.4	227.4	455.5
OVERALL REL STD DEV, %	56.60	55.38	61.14	46.81	49.67	53.16	48.05	83.59
SINGLE STD DEV, (SR)	168.7		145.5		163.5		307.6	
ANALYST REL DEV, %	37.42		38.38		31.84		60.42	

WATER LEGEND

1 - DISTILLED WATER
2 - TAP WATER
3 - SURFACE WATER
4 - INDUSTRIAL EFFLUENT

TABLE 7-10

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

STATISTICAL SUMMARY FOR CIS-1,3-DICHLOROPROPENE ANALYSES BY WATER TYPE

	WATER 1		WATER 2		WATER 3		WATER 4	
LOW YOUDEN PAIR	1	2	1	2	1	2	1	2
NUMBER OF DATA POINTS	10	10	11	11	11	12	12	12
TRUE CONC (C) UG/L	8.0	8.9	8.0	8.9	8.0	8.9	8.0	8.9
MEAN RECOVERY (X)	9.6	10.1	8.5	11.1	9.6	10.1	9.2	10.0
ACCURACY(%REL ERROR)	19.50	13.03	6.14	24.41	20.34	13.81	15.21	12.87
OVERALL STD DEV (S)	2.1	2.8	2.6	4.1	1.7	4.2	2.1	2.9
OVERALL REL STD DEV, %	21.48	28.12	30.17	36.84	17.25	41.05	22.66	29.08
SINGLE STD DEV, (SR)	2.3		2.5		2.5		1.8	
ANALYST REL DEV, %	23.80		25.54		25.29		18.41	
MEDIUM YOUDEN PAIR	3	4	3	4	3	4	3	4
NUMBER OF DATA POINTS	10	9	11	12	12	12	12	12
TRUE CONC (C) UG/L	85.0	89.0	85.0	89.0	85.0	89.0	85.0	89.0
MEAN RECOVERY (X)	113.5	117.1	113.6	113.6	110.1	117.1	108.2	116.6
ACCURACY(%REL ERROR)	33.49	31.55	33.67	27.69	29.59	31.63	27.31	30.96
OVERALL STD DEV (S)	18.9	23.8	27.7	25.0	38.0	19.5	22.3	22.7
OVERALL REL STD DEV, %	16.64	20.33	24.39	21.96	34.46	16.65	20.64	19.51
SINGLE STD DEV, (SR)	15.6		14.8		26.0		14.4	
ANALYST REL DEV, %	13.50		12.99		22.84		12.84	
HIGH YOUDEN PAIR	5	6	5	6	5	6	5	6
NUMBER OF DATA POINTS	10	9	11	12	12	11	12	11
TRUE CONC (C) UG/L	357.0	321.0	357.0	321.0	357.0	321.0	357.0	321.0
MEAN RECOVERY (X)	440.5	342.0	387.2	365.8	362.5	336.0	432.3	323.8
ACCURACY(%REL ERROR)	23.38	6.55	8.45	13.96	1.55	4.68	21.10	0.89
OVERALL STD DEV (S)	163.9	67.8	151.7	80.0	170.3	91.1	139.2	90.3
OVERALL REL STD DEV, %	37.22	19.83	39.18	21.87	46.98	27.13	32.20	27.89
SINGLE STD DEV, (SR)	95.8		109.8		101.1		64.3	
ANALYST REL DEV, %	24.48		29.17		28.93		17.01	

WATER LEGEND

1 - DISTILLED WATER
2 - TAP WATER
3 - SURFACE WATER
4 - INDUSTRIAL EFFLUENT

TABLE 7-11

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                     ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
                           OFFICE OF RESEARCH AND DEVELOPMENT
                             ENVIRONMENTAL PROTECTION AGENCY

                   ** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

              STATISTICAL SUMMARY FOR DIBROMOCHLOROMETHANE ANALYSES BY WATER TYPE

                             WATER  1           WATER  2           WATER  3           WATER  4
-----------------------------------------------------------------------------------------------------
LOW YOUDEN PAIR               1        2         1        2         1        2         1        2
NUMBER OF DATA POINTS        14       13        15       13        13       15        11       13
TRUE CONC (C) UG/L          8.1      9.0       8.1      9.0       8.1      9.0       8.1      9.0
MEAN RECOVERY (X)           8.0      9.2       7.8      9.8       8.8      8.7       7.7      9.3
ACCURACY(%REL ERROR)      -0.98     2.39     -3.21     9.23      8.07    -3.67     -5.50     2.99
OVERALL STD DEV (S)         1.8      2.1       1.3      2.9       1.2      2.2       1.0      1.7
OVERALL REL STD DEV, %    22.01    22.95     41.91    29.77     13.26    25.41     12.78    18.82

SINGLE    STD DEV, (SR)         1.3                1.8                1.3                1.2
ANALYST   REL DEV, %          14.66              19.98              15.25              13.61
-----------------------------------------------------------------------------------------------------
MEDIUM YOUDEN PAIR            3        4         3        4         3        4         3        4
NUMBER OF DATA POINTS        14       13        14       15        15       15        14       14
TRUE CONC (C) UG/L         86.0     90.0      86.0     90.0      86.0     90.0      86.0     90.0
MEAN RECOVERY (X)          96.1     78.4      99.6     67.3      99.9     75.4      98.4     82.0
ACCURACY(%REL ERROR)      11.71   -12.92     15.81   -25.27     16.22   -16.23     14.40    -8.94
OVERALL STD DEV (S)        15.1     14.8      26.2     14.5      23.5     12.3      17.9     30.1
OVERALL REL STD DEV, %    15.75    18.83     26.30    21.54     23.55    16.35     18.14    36.68

SINGLE    STD DEV, (SR)        18.7               20.8               18.2               20.6
ANALYST   REL DEV, %          21.43              24.91              20.72              22.81
-----------------------------------------------------------------------------------------------------
HIGH YOUDEN PAIR              5        6         5        6         5        6         5        6
NUMBER OF DATA POINTS        12       13        15       15        15       14        14       13
TRUE CONC (C) UG/L        360.0    324.0     360.0    324.0     360.0    324.0     360.0    324.0
MEAN RECOVERY (X)         368.1    331.6     412.0    388.1     378.2    326.8     396.5    349.4
ACCURACY(%REL ERROR)       2.24     2.35     14.43    19.78      5.05     0.86     10.15     7.85
OVERALL STD DEV (S)        74.1     44.9      97.7    142.2     101.0     58.0      76.8     99.6
OVERALL REL STD DEV, %    20.13    13.54     22.74    36.65     26.71    17.74     19.37    28.51

SINGLE    STD DEV, (SR)        45.2               83.0               65.1               51.9
ANALYST   REL DEV, %          12.91              20.75              18.47              13.92

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WATER LEGEND
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1 - DISTILLED WATER
2 - TAP WATER
3 - SURFACE WATER
4 - INDUSTRIAL EFFLUENT
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TABLE 7-12

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

STATISTICAL SUMMARY FOR ETHYL BENZENE ANALYSES BY WATER TYPE

	WATER 1		WATER 2		WATER 3		WATER 4	
LOW YOUDEN PAIR	1	2	1	2	1	2	1	2
NUMBER OF DATA POINTS	14	14	11	12	14	14	13	12
TRUE CONC (C) UG/L	15.0	17.0	15.0	17.0	15.0	17.0	15.0	17.0
MEAN RECOVERY (X)	16.7	19.6	17.6	20.2	19.0	21.0	19.8	19.5
ACCURACY(%REL ERROR)	11.62	15.59	17.39	18.82	26.76	23.47	32.23	14.80
OVERALL STD DEV (S)	2.4	3.8	2.4	5.8	3.6	2.9	4.7	4.4
OVERALL REL STD DEV, %	14.25	19.48	13.74	28.47	18.97	13.84	23.93	22.69
SINGLE STD DEV, (SR)	3.5		5.1		3.4		4.7	
ANALYST REL DEV, %	19.19		27.02		17.22		23.99	
MEDIUM YOUDEN PAIR	3	4	3	4	3	4	3	4
NUMBER OF DATA POINTS	15	14	12	11	14	14	13	13
TRUE CONC (C) UG/L	162.0	170.0	162.0	170.0	162.0	170.0	162.0	170.0
MEAN RECOVERY (X)	167.7	164.8	166.1	174.5	185.8	175.8	166.1	191.0
ACCURACY(%REL ERROR)	3.49	-3.06	2.54	2.66	14.68	3.40	2.50	12.35
OVERALL STD DEV (S)	37.0	34.2	36.9	12.0	32.9	26.7	27.5	59.7
OVERALL REL STD DEV, %	22.06	20.76	22.21	6.87	17.72	15.20	16.57	31.27
SINGLE STD DEV, (SR)	20.3		27.7		24.9		40.9	
ANALYST REL DEV, %	12.24		16.25		13.76		22.91	
HIGH YOUDEN PAIR	5	6	5	6	5	6	5	6
NUMBER OF DATA POINTS	15	15	12	12	14	14	13	13
TRUE CONC (C) UG/L	680.0	612.0	680.0	612.0	680.0	612.0	680.0	612.0
MEAN RECOVERY (X)	641.3	615.4	591.6	673.7	631.5	615.0	659.4	604.8
ACCURACY(%REL ERROR)	-5.69	0.56	-13.00	10.09	-7.13	0.49	-3.03	-1.18
OVERALL STD DEV (S)	181.0	180.2	224.0	171.5	188.9	150.0	260.2	164.6
OVERALL REL STD DEV, %	28.22	29.28	37.86	25.46	29.92	24.39	39.47	27.22
SINGLE STD DEV, (SR)	97.2		173.5		104.3		155.5	
ANALYST REL DEV, %	15.47		27.42		16.73		24.60	

WATER LEGEND

1 - DISTILLED WATER
2 - TAP WATER
3 - SURFACE WATER
4 - INDUSTRIAL EFFLUENT

TABLE 7-13

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

STATISTICAL SUMMARY FOR METHYLENE CHLORIDE ANALYSES BY WATER TYPE

	WATER 1		WATER 2		WATER 3		WATER 4	
LOW YOUDEN PAIR	1	2	1	2	1	2	1	2
NUMBER OF DATA POINTS	13	12	12	12	10	13	8	11
TRUE CONC (C) UG/L	8.0	7.2	8.0	7.2	8.0	7.2	8.0	7.2
MEAN RECOVERY (X)	8.0	8.8	11.8	11.3	11.4	17.3	11.7	6.0
ACCURACY(%REL ERROR)	0.10	22.34	46.98	57.52	42.44	140.17	46.72	-16.41
OVERALL STD DEV (S)	6.3	7.1	11.1	8.1	8.9	17.3	6.8	4.7
OVERALL REL STD DEV, %	78.16	80.77	94.12	71.11	77.89	99.95	58.18	77.95
SINGLE STD DEV, (SR)	2.3		8.8		12.0		6.2	
ANALYST REL DEV, %	27.41		75.96		83.32		69.88	
MEDIUM YOUDEN PAIR	3	4	3	4	3	4	3	4
NUMBER OF DATA POINTS	14	13	13	14	13	10	13	13
TRUE CONC (C) UG/L	120.0	114.0	120.0	114.0	120.0	114.0	120.0	114.0
MEAN RECOVERY (X)	105.8	74.1	100.8	75.1	107.7	91.3	103.1	54.9
ACCURACY(%REL ERROR)	-11.80	-35.01	-16.01	-34.12	-10.22	-19.93	-14.12	-51.83
OVERALL STD DEV (S)	32.1	23.1	45.7	27.2	25.2	19.0	32.0	29.9
OVERALL REL STD DEV, %	30.31	31.23	45.37	36.21	23.34	20.80	31.09	54.50
SINGLE STD DEV, (SR)	21.4		30.9		13.9		27.6	
ANALYST REL DEV, %	23.76		35.11		14.00		34.93	
HIGH YOUDEN PAIR	5	6	5	6	5	6	5	6
NUMBER OF DATA POINTS	14	13	13	13	12	11	13	12
TRUE CONC (C) UG/L	432.0	480.0	432.0	480.0	432.0	480.0	432.0	480.0
MEAN RECOVERY (X)	390.6	409.2	323.2	390.4	399.4	393.0	343.7	357.9
ACCURACY(%REL ERROR)	-9.59	-14.76	-25.19	-18.66	-7.56	-18.13	-20.44	-25.44
OVERALL STD DEV (S)	159.8	117.9	100.0	174.0	166.4	90.0	165.2	185.2
OVERALL REL STD DEV, %	40.91	28.80	30.93	44.57	41.66	22.90	48.07	51.75
SINGLE STD DEV, (SR)	59.5		91.3		114.4		107.8	
ANALYST REL DEV, %	14.89		25.60		28.89		30.74	

WATER LEGEND

1 - DISTILLED WATER
2 - TAP WATER
3 - SURFACE WATER
4 - INDUSTRIAL EFFLUENT

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TABLE 7-14

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

STATISTICAL SUMMARY FOR TETRACHLOROETHENE ANALYSES BY WATER TYPE

	WATER 1		WATER 2		WATER 3		WATER 4	
LOW YOUDEN PAIR	1	2	1	2	1	2	1	2
NUMBER OF DATA POINTS	11	11	12	12	13	14	14	13
TRUE CONC (C) UG/L	9.0	10.0	9.0	10.0	9.0	10.0	9.0	10.0
MEAN RECOVERY (X)	10.1	11.3	9.9	10.1	10.4	12.1	10.1	9.5
ACCURACY(%REL ERROR)	11.82	13.00	9.91	0.83	15.60	20.93	12.50	-5.15
OVERALL STD DEV (S)	1.1	1.4	1.7	2.5	1.6	1.9	2.9	2.9
OVERALL REL STD DEV, %	11.08	12.65	17.07	24.45	15.43	15.51	28.58	30.28
SINGLE STD DEV, (SR)	1.2		2.4		1.9		3.2	
ANALYST REL DEV, %	11.04		23.66		16.71		32.28	
MEDIUM YOUDEN PAIR	3	4	3	4	3	4	3	4
NUMBER OF DATA POINTS	12	11	12	13	13	14	14	13
TRUE CONC (C) UG/L	95.0	100.0	95.0	100.0	95.0	100.0	95.0	100.0
MEAN RECOVERY (X)	111.7	106.6	90.3	103.2	101.4	105.6	84.1	100.4
ACCURACY(%REL ERROR)	17.60	6.55	-4.89	3.24	6.74	5.64	-11.52	0.40
OVERALL STD DEV (S)	18.3	17.4	25.1	16.4	20.8	16.8	20.1	42.9
OVERALL REL STD DEV, %	16.35	16.35	27.79	15.85	20.48	15.89	23.89	42.72
SINGLE STD DEV, (SR)	11.9		17.3		14.5		32.0	
ANALYST PEL DEV, %	10.87		17.87		14.01		34.71	
HIGH YOUDEN PAIR	5	6	5	6	5	6	5	6
NUMBER OF DATA POINTS	12	12	13	13	14	14	14	14
TRUE CONC (C) UG/L	400.0	360.0	400.0	360.0	400.0	360.0	400.0	360.0
MEAN RECOVERY (X)	407.2	366.9	371.3	373.6	358.8	396.2	325.1	306.2
ACCURACY(%REL ERROR)	1.81	1.92	-7.18	3.79	-10.31	10.06	-18.72	-14.93
OVERALL STD DEV (S)	54.2	64.2	126.7	102.0	95.3	138.4	99.5	82.8
OVERALL REL STD DEV, %	13.31	17.50	34.12	27.30	26.57	34.93	30.61	27.03
SINGLE STD DEV, (SR)	54.2		102.2		83.5		67.0	
ANALYST REL DEV, %	13.99		27.45		22.12		21.22	

WATER LEGEND

1 - DISTILLED WATER
2 - TAP WATER
3 - SURFACE WATER
4 - INDUSTRIAL EFFLUENT

TABLE 7-15

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

STATISTICAL SUMMARY FOR TOLUENE ANALYSES BY WATER TYPE

	WATER 1		WATER 2		WATER 3		WATER 4	
LOW YOUDEN PAIR	1	2	1	2	1	2	1	2
NUMBER OF DATA POINTS	12	12	13	14	14	11	12	11
TRUE CONC (C) UG/L	13.5	15.0	13.5	15.0	13.5	15.0	13.5	15.0
MEAN RECOVERY (X)	14.9	16.9	15.6	18.1	15.4	17.7	15.5	15.9
ACCURACY(%REL ERROR)	10.12	12.94	15.61	20.39	14.07	17.79	14.85	5.79
OVERALL STD DEV (S)	1.7	1.7	1.9	5.4	2.6	1.7	3.0	2.8
OVERALL REL STD DEV, %	11.56	10.31	12.22	30.12	17.03	9.77	19.39	17.66
SINGLE ANALYST STD DEV, (SR)	1.8		3.8		2.5		2.5	
SINGLE ANALYST REL DEV, %	11.29		22.55		15.01		15.82	
MEDIUM YOUDEN PAIR	3	4	3	4	3	4	3	4
NUMBER OF DATA POINTS	12	11	12	13	14	17	13	13
TRUE CONC (C) UG/L	142.0	150.0	142.0	150.0	142.0	150.0	142.0	150.0
MEAN RECOVERY (X)	152.9	157.6	137.5	154.4	159.8	152.8	140.6	147.6
ACCURACY(%REL ERROR)	7.68	5.05	-3.13	2.95	12.51	1.88	-1.00	-1.62
OVERALL STD DEV (S)	31.1	30.4	29.4	18.1	27.5	20.1	38.4	41.5
OVERALL REL STD DEV, %	20.33	19.33	20.63	11.74	17.23	13.15	27.29	28.10
SINGLE ANALYST STD DEV, (SR)	12.7		22.5		16.1		33.5	
SINGLE ANALYST REL DEV, %	8.17		15.40		10.27		23.27	
HIGH YOUDEN PAIR	5	6	5	6	5	6	5	6
NUMBER OF DATA POINTS	12	11	14	16	14	14	13	12
TRUE CONC (C) UG/L	600.0	540.0	600.0	540.0	600.0	540.0	600.0	540.0
MEAN RECOVERY (X)	516.7	520.3	552.7	571.7	536.9	551.2	516.1	494.5
ACCURACY(%REL ERROR)	-13.89	-3.64	-7.88	5.88	-10.51	2.07	-13.98	-8.42
OVERALL STD DEV (S)	159.4	71.7	178.1	155.2	175.3	149.0	158.4	73.3
OVERALL REL STD DEV, %	30.86	13.78	32.22	27.15	32.65	27.04	30.70	14.83
SINGLE ANALYST STD DEV, (SR)	110.1		118.4		103.3		100.2	
SINGLE ANALYST REL DEV, %	21.24		21.06		18.99		19.83	

WATER LEGEND

1 - DISTILLED WATER
2 - TAP WATER
3 - SURFACE WATER
4 - INDUSTRIAL EFFLUENT

TABLE 7-16

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

STATISTICAL SUMMARY FOR TRANS-1,2-DICHLOROETHENE ANALYSES BY WATER TYPE

	WATER 1		WATER 2		WATER 3		WATER 4	
LOW YOUDEN PAIR	1	2	1	2	1	2	1	2
NUMBER OF DATA POINTS	14	15	12	13	15	14	12	13
TRUE CONC (C) UG/L	5.0	4.5	5.0	4.5	5.0	4.5	5.0	4.5
MEAN RECOVERY (X)	5.1	4.9	5.1	4.6	5.1	4.7	4.6	4.6
ACCURACY(%REL ERROR)	1.14	8.44	1.33	1.37	2.67	3.65	-8.83	2.14
OVERALL STD DEV (S)	1.0	1.2	1.1	1.5	1.3	1.0	1.3	0.9
OVERALL REL STD DEV, %	18.96	24.64	21.01	33.81	25.44	21.74	28.87	19.27
SINGLE STD DEV, (SR)	0.8		1.0		0.9		0.9	
ANALYST REL DEV, %	16.47		20.59		18.24		19.68	
MEDIUM YOUDEN PAIR	3	4	3	4	3	4	3	4
NUMBER OF DATA POINTS	15	14	13	13	14	15	13	13
TRUE CONC (C) UG/L	75.0	71.0	75.0	71.0	75.0	71.0	75.0	71.0
MEAN RECOVERY (X)	79.8	55.4	84.9	61.1	79.2	59.3	79.7	55.4
ACCURACY(%REL ERROR)	6.42	-21.91	13.26	-13.99	5.61	-16.44	6.25	-21.96
OVERALL STD DEV (S)	12.8	12.0	16.4	15.2	14.5	11.4	12.0	18.7
OVERALL REL STD DEV, %	16.01	21.71	19.25	24.88	18.32	19.13	15.07	33.80
SINGLE STD DEV, (SR)	12.1		17.2		10.3		11.4	
ANALYST REL DEV, %	17.88		23.55		14.88		16.85	
HIGH YOUDEN PAIR	5	6	5	6	5	6	5	6
NUMBER OF DATA POINTS	15	15	12	13	14	15	12	13
TRUE CONC (C) UG/L	270.0	300.0	270.0	300.0	270.0	300.0	270.0	300.0
MEAN RECOVERY (X)	284.3	311.4	282.3	340.5	253.3	323.0	271.7	300.9
ACCURACY(%REL ERROR)	5.29	3.81	4.55	13.49	-6.20	7.66	0.63	0.31
OVERALL STD DEV (S)	61.9	57.1	27.6	59.3	29.3	52.0	41.7	81.7
OVERALL REL STD DEV, %	21.79	18.33	9.79	17.42	11.59	16.12	15.35	27.16
SINGLE STD DEV, (SR)	42.2		33.4		50.4		73.5	
ANALYST REL DEV, %	14.17		10.72		17.49		25.67	

WATER LEGEND

1 - DISTILLED WATER
2 - TAP WATER
3 - SURFACE WATER
4 - INDUSTRIAL EFFLUENT

TABLE 7-17

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

STATISTICAL SUMMARY FOR TRANS-1,3-DICHLOROPROPENE ANALYSES BY WATER TYPE

	WATER 1		WATER 2		WATER 3		WATER 4	
LOW YOUDEN PAIR	1	2	1	2	1	2	1	2
NUMBER OF DATA POINTS	11	12	12	12	11	11	12	12
TRUE CONC (C) UG/L	9.4	10.4	9.4	10.4	9.4	10.4	9.4	10.4
MEAN RECOVERY (X)	7.7	8.4	7.3	8.0	9.5	9.2	7.6	8.4
ACCURACY(%REL ERROR)	-17.60	-19.07	-22.52	-23.16	1.06	-11.45	-19.50	-18.83
OVERALL STD DEV (S)	1.9	2.2	2.0	2.3	2.5	2.3	1.1	1.5
OVERALL REL STD DEV, %	24.49	25.83	28.06	28.32	26.63	25.28	14.33	17.22
SINGLE STD DEV, (SR)	1.2		2.0		1.5		1.0	
ANALYST REL DEV, %	14.25		25.92		15.97		12.84	
MEDIUM YOUDEN PAIR	3	4	3	4	3	4	3	4
NUMBER OF DATA POINTS	11	10	11	13	11	11	12	12
TRUE CONC (C) UG/L	99.0	104.0	99.0	104.0	99.0	104.0	99.0	104.0
MEAN RECOVERY (X)	88.7	88.6	77.9	95.9	97.1	100.6	84.8	88.6
ACCURACY(%REL ERROR)	-10.42	-14.84	-21.27	-7.80	-1.97	-3.29	-14.30	-14.80
OVERALL STD DEV (S)	11.5	17.9	16.7	25.4	25.5	25.7	17.9	16.8
OVERALL REL STD DEV, %	12.98	20.21	21.41	26.54	26.23	25.53	21.11	18.92
SINGLE STD DEV, (SR)	8.2		10.9		10.6		16.4	
ANALYST REL DEV, %	9.30		12.57		10.77		18.94	
HIGH YOUDEN PAIR	5	6	5	6	5	6	5	6
NUMBER OF DATA POINTS	12	12	13	13	11	11	12	12
TRUE CONC (C) UG/L	416.0	374.0	416.0	374.0	416.0	374.0	416.0	374.0
MEAN RECOVERY (X)	325.2	257.6	351.1	286.3	335.2	311.1	330.1	290.6
ACCURACY(%REL ERROR)	-21.84	-31.13	-15.60	-23.44	-19.42	-16.82	-20.66	-22.30
OVERALL STD DEV (S)	89.2	105.1	88.2	78.4	76.4	70.7	78.5	61.2
OVERALL REL STD DEV, %	27.43	40.81	25.12	27.38	22.79	22.73	23.77	21.06
SINGLE STD DEV, (SR)	85.8		49.7		63.2		49.2	
ANALYST REL DEV, %	29.44		15.60		19.55		15.86	

WATER LEGEND

1 - DISTILLED WATER
2 - TAP WATER
3 - SURFACE WATER
4 - INDUSTRIAL EFFLUENT

TABLE 7-18

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

STATISTICAL SUMMARY FOR TRICHLOROETHENE ANALYSES BY WATER TYPE

		WATER 1		WATER 2		WATER 3		WATER 4	
LOW YOUDEN PAIR		1	2	1	2	1	2	1	2
NUMBER OF DATA POINTS		11	11	13	13	13	13	12	12
TRUE CONC (C) UG/L		6.0	5.4	6.0	5.4	6.0	5.4	6.0	5.4
MEAN RECOVERY (X)		7.9	8.4	7.3	7.6	8.7	8.8	6.7	7.8
ACCURACY(%REL ERROR)		31.36	54.88	22.44	41.17	44.36	62.54	12.22	45.22
OVERALL STD DEV (S)		1.5	1.7	1.3	2.1	2.3	2.9	1.4	3.8
OVERALL REL STD DEV, %		18.77	20.35	17.65	27.33	26.53	33.51	20.20	48.02
SINGLE	STD DEV, (SR)	1.4		1.4		2.3		2.4	
ANALYST	REL DEV, %	17.73		18.54		25.92		32.41	
MEDIUM YOUDEN PAIR		3	4	3	4	3	4	3	4
NUMBER OF DATA POINTS		9	10	13	14	13	13	13	13
TRUE CONC (C) UG/L		90.0	86.0	90.0	86.0	90.0	86.0	90.0	86.0
MEAN RECOVERY (X)		100.8	94.1	95.2	92.2	102.9	100.5	87.2	96.4
ACCURACY(%REL ERROR)		12.01	9.48	5.74	7.19	14.38	16.88	-3.11	12.12
OVERALL STD DEV (S)		6.3	11.8	27.2	18.3	23.0	16.9	19.1	35.3
OVERALL REL STD DEV, %		6.29	12.49	28.54	19.90	22.39	16.84	21.86	36.59
SINGLE	STD DEV, (SR)	7.0		20.1		12.9		21.7	
ANALYST	REL DEV, %	7.20		21.49		12.69		23.68	
HIGH YOUDEN PAIR		5	6	5	6	5	6	5	6
NUMBER OF DATA POINTS		10	10	14	14	13	12	13	13
TRUE CONC (C) UG/L		324.0	360.0	324.0	360.0	324.0	360.0	324.0	360.0
MEAN RECOVERY (X)		351.3	336.5	310.7	395.4	310.2	342.0	308.3	351.7
ACCURACY(%REL ERROR)		8.44	-6.51	-4.09	9.84	-4.27	-5.01	-4.85	-2.30
OVERALL STD DEV (S)		26.3	77.3	76.0	118.3	73.8	54.8	98.4	138.4
OVERALL REL STD DEV, %		7.48	22.96	24.46	29.92	23.81	16.03	31.93	39.34
SINGLE	STD DEV, (SR)	64.5		85.1		52.6		71.6	
ANALYST	REL DEV, %	18.77		24.11		16.14		21.70	

WATER LEGEND

1 - DISTILLED WATER
2 - TAP WATER
3 - SURFACE WATER
4 - INDUSTRIAL EFFLUENT

TABLE 7-19

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

STATISTICAL SUMMARY FOR TRICHLOROFLUOROMETHANE ANALYSES BY WATER TYPE

	WATER 1		WATER 2		WATER 3		WATER 4	
LOW YOUDEN PAIR	1	2	1	2	1	2	1	2
NUMBER OF DATA POINTS	10	11	10	10	11	11	11	11
TRUE CONC (C) UG/L	8.0	7.2	8.0	7.2	8.0	7.2	8.0	7.2
MEAN RECOVERY (X)	8.5	7.3	7.8	7.7	7.9	6.4	8.0	7.6
ACCURACY(%REL ERROR)	6.12	1.01	-2.75	7.64	-1.02	-10.73	0.57	5.87
OVERALL STD DEV (S)	2.1	2.4	2.2	2.4	2.7	1.9	1.6	1.6
OVERALL REL STD DEV, %	24.54	33.41	27.78	30.71	33.49	29.64	20.37	20.41
SINGLE STD DEV, (SR)	1.1		2.1		1.8		0.5	
ANALYST REL DEV, %	14.01		26.70		24.58		6.78	
MEDIUM YOUDEN PAIR	3	4	3	4	3	4	3	4
NUMBER OF DATA POINTS	11	10	10	11	11	11	11	11
TRUE CONC (C) UG/L	120.0	114.0	120.0	114.0	120.0	114.0	120.0	114.0
MEAN RECOVERY (X)	128.5	83.7	130.4	87.4	110.5	89.0	136.9	89.8
ACCURACY(%REL ERROR)	7.08	-26.61	8.64	-23.33	-7.91	-21.97	14.07	-21.25
OVERALL STD DEV (S)	40.3	33.1	33.3	33.2	29.5	27.1	32.1	29.0
OVERALL REL STD DEV, %	31.39	39.52	25.57	37.94	26.69	30.51	23.48	32.31
SINGLE STD DEV, (SR)	29.4		22.5		23.4		22.1	
ANALYST REL DEV, %	27.68		20.62		23.47		19.47	
HIGH YOUDEN PAIR	5	6	5	6	5	6	5	6
NUMBER OF DATA POINTS	11	11	11	11	11	11	11	11
TRUE CONC (C) UG/L	432.0	480.0	432.0	480.0	432.0	480.0	432.0	480.0
MEAN RECOVERY (X)	365.2	504.7	442.0	502.3	328.7	447.4	431.1	515.2
ACCURACY(%REL ERROR)	-15.47	5.15	2.32	4.66	-23.92	-6.80	-0.21	7.33
OVERALL STD DEV (S)	131.8	176.2	129.9	163.0	145.8	98.7	102.1	156.2
OVERALL REL STD DEV, %	36.10	34.91	29.38	32.44	44.35	22.07	23.69	30.31
SINGLE STD DEV, (SR)	140.7		79.4		127.4		127.2	
ANALYST REL DEV, %	32.35		16.81		32.82		26.89	

WATER LEGEND

1 - DISTILLED WATER
2 - TAP WATER
3 - SURFACE WATER
4 - INDUSTRIAL EFFLUENT

TABLE 7-20

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

STATISTICAL SUMMARY FOR 1,1-DICHLOROETHANE ANALYSES BY WATER TYPE

	WATER 1		WATER 2		WATER 3		WATER 4	
LOW YOUDEN PAIR	1	2	1	2	1	2	1	2
NUMBER OF DATA POINTS	14	13	11	12	13	13	15	15
TRUE CONC (C) UG/L	10.8	12.0	10.8	12.0	10.8	12.0	10.8	12.0
MEAN RECOVERY (X)	12.0	12.5	10.9	12.4	11.8	13.0	11.4	13.2
ACCURACY(%REL ERROR)	11.38	4.36	0.84	3.40	9.47	8.27	5.80	9.83
OVERALL STD DEV (S)	2.5	2.3	2.0	2.9	2.9	2.2	3.8	3.7
OVERALL REL STD DEV, %	20.69	18.63	18.68	23.71	24.38	16.91	33.01	28.10
SINGLE STD DEV, (SR)	1.6		1.6		2.4		2.6	
ANALYST REL DEV, %	12.97		13.98		19.67		20.89	
MEDIUM YOUDEN PAIR	3	4	3	4	3	4	3	4
NUMBER OF DATA POINTS	14	12	11	11	13	13	15	15
TRUE CONC (C) UG/L	114.0	120.0	114.0	120.0	114.0	120.0	114.0	120.0
MEAN RECOVERY (X)	116.7	94.2	122.2	98.7	125.0	107.3	125.1	107.6
ACCURACY(%REL ERROR)	2.34	-21.47	7.22	-17.77	9.65	-10.55	9.77	-10.37
OVERALL STD DEV (S)	20.8	13.2	17.5	15.4	20.7	15.9	22.4	34.8
OVERALL REL STD DEV, %	17.87	14.00	14.35	15.66	16.52	14.77	17.89	32.35
SINGLE STD DEV, (SR)	17.3		19.2		14.4		26.1	
ANALYST REL DEV, %	16.36		17.36		12.40		22.46	
HIGH YOUDEN PAIR	5	6	5	6	5	6	5	6
NUMBER OF DATA POINTS	13	14	12	12	13	12	14	15
TRUE CONC (C) UG/L	480.0	432.0	480.0	432.0	480.0	432.0	480.0	432.0
MEAN RECOVERY (X)	524.3	444.0	500.3	467.5	449.5	455.6	511.5	473.9
ACCURACY(%REL ERROR)	9.22	2.79	4.23	8.22	-6.35	5.46	6.56	9.70
OVERALL STD DEV (S)	70.4	76.5	52.0	78.7	52.9	44.3	101.6	132.8
OVERALL REL STD DEV, %	13.43	17.22	10.40	16.83	11.77	9.73	19.87	28.03
SINGLE STD DEV, (SR)	64.9		69.8		49.4		114.8	
ANALYST REL DEV, %	13.40		14.42		10.92		23.30	

WATER LEGEND

1 - DISTILLED WATER
2 - TAP WATER
3 - SURFACE WATER
4 - INDUSTRIAL EFFLUENT

TABLE 7-21

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

STATISTICAL SUMMARY FOR 1,1-DICHLOROETHENE ANALYSES BY WATER TYPE

	WATER 1		WATER 2		WATER 3		WATER 4	
LOW YOUDEN PAIR	1	2	1	2	1	2	1	2
NUMBER OF DATA POINTS	14	14	10	12	13	14	11	13
TRUE CONC (C) UG/L	8.0	7.2	8.0	7.2	8.0	7.2	8.0	7.2
MEAN RECOVERY (X)	9.4	8.9	8.9	9.4	9.2	8.1	7.6	8.3
ACCURACY(%REL ERROR)	17.02	23.51	11.09	31.25	15.10	11.95	-5.57	15.22
OVERALL STD DEV (S)	3.7	3.7	1.1	4.6	2.2	2.9	1.4	2.7
OVERALL REL STD DEV, %	39.16	41.64	12.77	48.40	23.36	35.94	19.01	32.63
SINGLE STD DEV, (SR)	2.6		3.2		2.2		1.5	
ANALYST REL DEV, %	28.10		35.02		25.36		18.94	
MEDIUM YOUDEN PAIR	3	4	3	4	3	4	3	4
NUMBER OF DATA POINTS	15	14	12	13	13	14	12	12
TRUE CONC (C) UG/L	120.0	114.0	120.0	114.0	120.0	114.0	120.0	114.0
MEAN RECOVERY (X)	120.1	75.3	119.8	79.1	111.8	85.3	105.4	65.5
ACCURACY(%REL ERROR)	0.04	-33.97	-0.20	-30.65	-6.79	-25.13	-12.13	-42.51
OVERALL STD DEV (S)	41.7	13.4	28.6	16.1	17.3	12.2	14.8	20.5
OVERALL REL STD DEV, %	34.74	17.85	23.88	20.38	15.43	14.30	14.04	31.22
SINGLE STD DEV, (SR)	27.9		22.6		13.7		19.0	
ANALYST REL DEV, %	28.55		22.75		13.88		22.22	
HIGH YOUDEN PAIR	5	6	5	6	5	6	5	6
NUMBER OF DATA POINTS	15	15	12	12	13	13	13	12
TRUE CONC (C) UG/L	432.0	480.0	432.0	480.0	432.0	480.0	432.0	480.0
MEAN RECOVERY (X)	499.1	585.7	434.3	524.8	434.2	533.1	435.2	445.7
ACCURACY(%REL ERROR)	15.54	22.03	0.52	9.34	0.50	11.05	0.73	-7.14
OVERALL STD DEV (S)	221.6	282.6	97.0	138.7	120.8	157.5	119.5	81.1
OVERALL REL STD DEV, %	44.39	48.26	22.34	26.44	27.83	29.55	27.47	18.20
SINGLE STD DEV, (SR)	92.6		60.4		75.9		104.9	
ANALYST REL DEV, %	17.08		12.59		15.69		23.81	

WATER LEGEND

1 - DISTILLED WATER
2 - TAP WATER
3 - SURFACE WATER
4 - INDUSTRIAL EFFLUENT

TABLE 7-22

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

STATISTICAL SUMMARY FOR 1,1,1-TRICHLOROETHANE ANALYSES BY WATER TYPE

	WATER 1		WATER 2		WATER 3		WATER 4	
LOW YOUDEN PAIR	1	2	1	2	1	2	1	2
NUMBER OF DATA POINTS	13	14	13	13	13	14	11	11
TRUE CONC (C) UG/L	9.0	10.0	9.0	10.0	9.0	10.0	9.0	10.0
MEAN RECOVERY (X)	10.0	11.7	9.3	10.9	9.1	10.7	9.8	10.7
ACCURACY(%REL ERROR)	11.62	17.36	2.91	8.62	1.37	6.64	9.29	7.18
OVERALL STD DEV (S)	1.8	1.9	1.9	2.2	1.2	2.9	2.0	1.8
OVERALL REL STD DEV, %	18.08	16.14	20.73	20.32	13.06	26.99	20.63	16.44
SINGLE STD DEV, (SR)	1.1		1.5		2.0		1.0	
ANALYST REL DEV, %	10.26		14.70		20.10		9.72	
MEDIUM YOUDEN PAIR	3	4	3	4	3	4	3	4
NUMBER OF DATA POINTS	14	13	13	14	15	15	12	12
TRUE CONC (C) UG/L	95.0	100.0	95.0	100.0	95.0	100.0	95.0	100.0
MEAN RECOVERY (X)	110.5	87.9	114.1	90.7	104.7	95.8	95.0	90.2
ACCURACY(%REL ERROR)	16.34	-12.12	20.09	-9.28	10.23	-4.19	-0.00	-9.78
OVERALL STD DEV (S)	15.3	21.1	21.5	23.7	25.5	22.6	20.5	23.6
OVERALL REL STD DEV, %	13.84	24.04	18.88	26.12	24.33	23.54	21.56	26.14
SINGLE STD DEV, (SR)	10.5		19.4		19.8		16.9	
ANALYST REL DEV, %	10.59		18.99		19.74		18.26	
HIGH YOUDEN PAIR	5	6	5	6	5	6	5	6
NUMBER OF DATA POINTS	14	14	14	14	15	15	11	12
TRUE CONC (C) UG/L	400.0	360.0	400.0	360.0	400.0	360.0	400.0	360.0
MEAN RECOVERY (X)	456.7	386.9	465.1	411.1	375.0	374.8	397.6	390.9
ACCURACY(%REL ERROR)	14.18	7.48	16.27	14.18	-6.26	4.10	-0.61	8.57
OVERALL STD DEV (S)	106.1	81.1	106.0	94.0	136.6	85.0	92.6	93.9
OVERALL REL STD DEV, %	23.22	20.95	22.80	22.87	36.44	22.67	23.29	24.02
SINGLE STD DEV, (SR)	51.7		88.9		93.5		64.2	
ANALYST REL DEV, %	12.25		20.29		24.93		16.30	

WATER LEGEND

1 - DISTILLED WATER
2 - TAP WATER
3 - SURFACE WATER
4 - INDUSTRIAL EFFLUENT

TABLE 7-23

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

STATISTICAL SUMMARY FOR 1,1,2-TRICHLOROETHANE ANALYSES BY WATER TYPE

	WATER 1		WATER 2		WATER 3		WATER 4	
LOW YOUDEN PAIR	1	2	1	2	1	2	1	2
NUMBER OF DATA POINTS	13	13	12	13	11	12	12	13
TRUE CONC (C) UG/L	10.8	12.0	10.8	12.0	10.8	12.0	10.8	12.0
MEAN RECOVERY (X)	12.0	12.9	12.0	14.9	13.0	13.5	11.2	13.7
ACCURACY(%REL ERROR)	11.04	7.88	11.42	24.36	20.12	12.92	4.09	14.10
OVERALL STD DEV (S)	1.9	2.7	1.5	4.7	1.7	2.3	1.3	2.4
OVERALL REL STD DEV, %	16.22	20.62	12.69	31.57	12.94	17.01	11.47	17.84
SINGLE ANALYST STD DEV, (SR)	1.9		3.0		1.8		2.3	
SINGLE ANALYST REL DEV, %	14.85		22.17		13.90		18.33	
MEDIUM YOUDEN PAIR	3	4	3	4	3	4	3	4
NUMBER OF DATA POINTS	12	13	12	13	13	13	13	13
TRUE CONC (C) UG/L	114.0	120.0	114.0	120.0	114.0	120.0	114.0	120.0
MEAN RECOVERY (X)	124.5	121.8	120.2	130.9	133.0	137.5	115.5	134.9
ACCURACY(%REL ERROR)	9.20	1.46	5.42	9.08	16.66	14.58	1.30	12.38
OVERALL STD DEV (S)	9.1	14.0	22.3	12.9	27.0	17.8	12.0	28.6
OVERALL REL STD DEV, %	7.29	11.46	18.55	9.83	20.33	12.97	10.36	21.18
SINGLE ANALYST STD DEV, (SR)	11.2		18.8		18.2		21.5	
SINGLE ANALYST REL DEV, %	9.08		14.96		13.42		17.17	
HIGH YOUDEN PAIR	5	6	5	6	5	6	5	6
NUMBER OF DATA POINTS	14	13	12	13	13	13	13	13
TRUE CONC (C) UG/L	480.0	432.0	480.0	432.0	480.0	432.0	480.0	432.0
MEAN RECOVERY (X)	438.0	360.9	447.7	447.7	444.3	417.6	461.9	401.0
ACCURACY(%REL ERROR)	-8.75	-16.47	-6.72	3.64	-7.43	-3.32	-3.77	-7.17
OVERALL STD DEV (S)	115.4	87.8	60.4	83.4	100.5	108.7	103.1	130.8
OVERALL REL STD DEV, %	26.35	24.33	13.48	18.62	22.61	26.04	22.31	32.62
SINGLE ANALYST STD DEV, (SR)	76.5		44.9		76.4		79.9	
SINGLE ANALYST REL DEV, %	19.16		10.04		17.73		18.52	

WATER LEGEND

1 - DISTILLED WATER
2 - TAP WATER
3 - SURFACE WATER
4 - INDUSTRIAL EFFLUENT

TABLE 7-24

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

STATISTICAL SUMMARY FOR 1,1,2,2-TETRACHLOROETHANE ANALYSES BY WATER TYPE

	WATER 1		WATER 2		WATER 3		WATER 4	
LOW YOUDEN PAIR	1	2	1	2	1	2	1	2
NUMBER OF DATA POINTS	13	12	13	12	12	12	13	14
TRUE CONC (C) UG/L	15.0	17.0	15.0	17.0	15.0	17.0	15.0	17.0
MEAN RECOVERY (X)	16.3	16.8	15.3	15.7	17.3	16.8	16.7	14.8
ACCURACY(%REL ERROR)	8.82	-1.42	1.95	-7.50	15.28	-1.42	11.33	-12.73
OVERALL STD DEV (S)	5.0	2.6	3.5	2.5	5.3	4.7	4.5	6.3
OVERALL REL STD DEV, %	30.51	15.26	22.59	16.03	30.70	28.30	27.15	42.71
SINGLE STD DEV, (SR)	3.4		2.8		3.5		4.6	
ANALYST REL DEV, %	20.82		17.87		20.81		29.13	
MEDIUM YOUDEN PAIR	3	4	3	4	3	4	3	4
NUMBER OF DATA POINTS	14	12	14	13	13	13	14	14
TRUE CONC (C) UG/L	162.0	170.0	162.0	170.0	162.0	170.0	162.0	170.0
MEAN RECOVERY (X)	161.4	162.5	152.2	165.2	173.5	175.4	136.1	167.6
ACCURACY(%REL ERROR)	-0.34	-4.44	-6.03	-2.83	7.07	3.20	-15.99	-1.42
OVERALL STD DEV (S)	29.8	31.9	40.9	35.3	37.9	35.5	41.9	52.0
OVERALL REL STD DEV, %	18.49	19.61	26.86	21.39	21.84	20.25	30.82	31.04
SINGLE STD DEV, (SR)	22.4		21.9		19.8		53.8	
ANALYST REL DEV, %	13.85		13.78		11.33		35.46	
HIGH YOUDEN PAIR	5	6	5	6	5	6	5	6
NUMBER OF DATA POINTS	14	14	14	13	13	13	14	14
TRUE CONC (C) UG/L	680.0	612.0	680.0	612.0	680.0	612.0	680.0	612.0
MEAN RECOVERY (X)	580.2	587.7	589.5	562.2	624.4	593.0	566.5	535.8
ACCURACY(%REL ERROR)	-14.68	-3.97	-13.31	-8.13	-8.18	-3.11	-16.69	-12.45
OVERALL STD DEV (S)	151.5	105.5	154.0	131.0	142.3	113.1	163.2	162.8
OVERALL REL STD DEV, %	26.11	17.96	26.13	23.30	22.78	19.08	28.81	30.38
SINGLE STD DEV, (SR)	113.0		102.8		107.2		204.4	
ANALYST REL DEV, %	19.35		17.85		17.61		37.09	

WATER LEGEND

1 - DISTILLED WATER
2 - TAP WATER
3 - SURFACE WATER
4 - INDUSTRIAL EFFLUENT

TABLE 7-25

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

STATISTICAL SUMMARY FOR 1,2-DICHLOROBENZENE/1,4-DICHLO ANALYSES BY WATER TYPE

	WATER 1		WATER 2		WATER 3		WATER 4	
LOW YOUDEN PAIR	1	2	1	2	1	2	1	2
NUMBER OF DATA POINTS	10	11	9	9	10	10	11	11
TRUE CONC (C) UG/L	16.0	16.3	16.0	16.3	16.0	16.3	16.0	16.3
MEAN RECOVERY (X)	18.9	20.5	20.8	20.1	22.5	22.6	21.3	19.6
ACCURACY(%REL ERROR)	18.00	25.71	30.07	23.52	40.56	38.90	33.35	19.99
OVERALL STD DEV (S)	3.8	5.4	7.1	5.4	11.3	4.9	10.2	10.0
OVERALL REL STD DEV, %	19.90	26.28	34.13	26.69	50.31	21.53	47.88	51.04
SINGLE STD DEV, (SR)	2.9		4.8		6.4		7.7	
ANALYST REL DEV, %	14.87		23.64		28.42		37.53	
MEDIUM YOUDEN PAIR	3	4	3	4	3	4	3	4
NUMBER OF DATA POINTS	11	10	10	10	10	10	11	10
TRUE CONC (C) UG/L	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0
MEAN RECOVERY (X)	188.9	188.5	209.5	188.9	234.5	188.8	193.4	210.3
ACCURACY(%REL ERROR)	-5.55	-5.75	4.77	-5.53	17.26	-5.61	-3.31	5.15
OVERALL STD DEV (S)	72.1	63.4	70.9	65.5	104.7	53.0	83.9	51.4
OVERALL REL STD DEV, %	38.17	33.63	33.83	34.69	44.63	28.09	43.36	24.42
SINGLE STD DEV, (SR)	46.2		59.0		72.4		49.6	
ANALYST REL DEV, %	24.46		29.59		34.21		24.60	
HIGH YOUDEN PAIR	5	6	5	6	5	6	5	6
NUMBER OF DATA POINTS	11	11	10	10	10	10	11	11
TRUE CONC (C) UG/L	778.0	780.0	778.0	780.0	778.0	780.0	778.0	780.0
MEAN RECOVERY (X)	781.8	718.6	721.1	825.3	783.1	670.2	713.3	732.7
ACCURACY(%REL ERROR)	0.49	-7.87	-7.32	5.81	0.65	-14.07	-8.32	-6.07
OVERALL STD DEV (S)	184.6	160.7	289.8	328.3	162.0	190.4	221.4	158.6
OVERALL REL STD DEV, %	23.61	22.36	40.20	39.77	20.69	28.41	31.04	21.65
SINGLE STD DEV, (SR)	148.1		309.4		127.8		193.5	
ANALYST REL DEV, %	19.74		40.02		17.59		26.76	

WATER LEGEND

1 - DISTILLED WATER
2 - TAP WATER
3 - SURFACE WATER
4 - INDUSTRIAL EFFLUENT

TABLE 7-26

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                 ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
                        OFFICE OF RESEARCH AND DEVELOPMENT
                          ENVIRONMENTAL PROTECTION AGENCY

                 ** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

             STATISTICAL SUMMARY FOR 1,2-DICHLOROETHANE ANALYSES BY WATER TYPE

                                 WATER  1          WATER  2          WATER  3          WATER  4
------------------------------------------------------------------------------------------------------
LOW YOUDEN PAIR                 1        2        1        2        1        2        1        2
NUMBER OF DATA POINTS          11       14       12       12       14       13       14       13
TRUE CONC (C) UG/L            9.9     11.0      9.9     11.0      9.9     11.0      9.9     11.0
MEAN RECOVERY (X)            10.9     11.3      9.8     11.5     11.4     11.5      9.2     11.5
ACCURACY(%REL ERROR)        10.10     2.86    -0.67     4.85    15.08     4.90    -7.14     4.65
OVERALL STD DEV (S)           1.3      2.6      2.1      1.6      4.7      2.7      3.5      2.9
OVERALL REL STD DEV, %      11.63    23.02    21.80    14.13    41.18    23.48    37.59    25.26

SINGLE    STD DEV, (SR)          1.6               1.7               2.7               2.4
ANALYST   REL DEV, %            14.28             15.95             23.57             22.99
------------------------------------------------------------------------------------------------------
MEDIUM YOUDEN PAIR              3        4        3        4        3        4        3        4
NUMBER OF DATA POINTS          15       14       13       14       13       14       13       13
TRUE CONC (C) UG/L          104.0    110.0    104.0    110.0    104.0    110.0    104.0    110.0
MEAN RECOVERY (X)           117.0     96.9    119.8     99.5    121.1    107.4    110.7     98.7
ACCURACY(%REL ERROR)        12.48   -11.90    15.16    -9.56    16.43    -2.40     6.49   -10.23
OVERALL STD DEV (S)          19.4     27.5     23.7     22.2     21.2     19.5     15.5     27.4
OVERALL REL STD DEV, %      16.58    28.33    19.81    22.31    17.47    18.16    13.99    27.75

SINGLE    STD DEV, (SR)         22.7              26.1              17.2              17.4
ANALYST   REL DEV, %            21.19             23.77             15.09             16.61
------------------------------------------------------------------------------------------------------
HIGH YOUDEN PAIR                5        6        5        6        5        6        5        6
NUMBER OF DATA POINTS          15       15       13       14       13       14       13       13
TRUE CONC (C) UG/L          440.0    396.0    440.0    396.0    440.0    396.0    440.0    396.0
MEAN RECOVERY (X)           468.9    407.6    467.0    439.0    412.4    400.1    440.1    419.1
ACCURACY(%REL ERROR)         6.57     2.92     6.14    10.85    -6.26     1.03     0.03     5.82
OVERALL STD DEV (S)         103.7     64.1     48.9     78.1     67.1     88.2     67.2     82.6
OVERALL REL STD DEV, %      22.12    15.73    10.48    17.80    16.28    22.04    15.26    19.70

SINGLE    STD DEV, (SR)         60.0              59.1              62.5              53.0
ANALYST   REL DEV, %            13.69             13.05             15.39             12.33
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WATER LEGEND
------------
1 - DISTILLED WATER
2 - TAP WATER
3 - SURFACE WATER
4 - INDUSTRIAL EFFLUENT
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TABLE 7-27

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

STATISTICAL SUMMARY FOR 1,2-DICHLOROPROPANE ANALYSES BY WATER TYPE

	WATER 1		WATER 2		WATER 3		WATER 4	
LOW YOUDEN PAIR	1	2	1	2	1	2	1	2
NUMBER OF DATA POINTS	12	12	12	13	13	12	12	12
TRUE CONC (C) UG/L	13.5	15.0	13.5	15.0	13.5	15.0	13.5	15.0
MEAN RECOVERY (X)	17.5	19.9	17.9	18.2	19.8	19.1	15.6	18.6
ACCURACY(%REL ERROR)	29.63	32.72	32.78	21.13	46.44	27.47	15.80	23.83
OVERALL STD DEV (S)	2.6	3.2	2.6	2.9	3.6	2.6	4.0	2.9
OVERALL REL STD DEV, %	14.89	16.07	14.65	15.94	18.19	13.42	25.77	15.84
SINGLE STD DEV, (SR)	1.8		2.8		2.1		3.1	
ANALYST REL DEV, %	9.46		15.32		10.87		18.04	
MEDIUM YOUDEN PAIR	3	4	3	4	3	4	3	4
NUMBER OF DATA POINTS	12	11	13	13	13	13	11	14
TRUE CONC (C) UG/L	142.0	150.0	142.0	150.0	142.0	150.0	142.0	150.0
MEAN RECOVERY (X)	203.5	181.7	184.1	186.3	189.1	202.6	176.0	218.5
ACCURACY(%REL ERROR)	43.34	21.15	29.65	24.19	33.16	35.06	23.92	45.65
OVERALL STD DEV (S)	30.8	19.6	40.0	18.8	29.7	27.4	16.9	57.4
OVERALL REL STD DEV, %	15.14	10.80	21.73	10.09	15.69	13.53	9.62	26.28
SINGLE STD DEV, (SR)	20.5		25.9		20.1		15.9	
ANALYST REL DEV, %	10.65		13.97		10.24		8.09	
HIGH YOUDEN PAIR	5	6	5	6	5	6	5	6
NUMBER OF DATA POINTS	12	12	12	13	13	13	12	13
TRUE CONC (C) UG/L	600.0	540.0	600.0	540.0	600.0	540.0	600.0	540.0
MEAN RECOVERY (X)	670.4	544.1	611.3	611.3	598.2	607.4	643.7	612.1
ACCURACY(%REL ERROR)	11.73	0.75	1.89	13.20	-0.29	12.48	7.28	13.35
OVERALL STD DEV (S)	135.2	120.7	55.4	64.3	113.8	122.0	112.3	122.5
OVERALL REL STD DEV, %	20.17	22.19	9.07	10.53	19.02	20.09	17.44	20.01
SINGLE STD DEV, (SR)	98.5		45.9		96.2		116.1	
ANALYST REL DEV, %	16.22		7.51		15.95		18.50	

WATER LEGEND

1 - DISTILLED WATER
2 - TAP WATER
3 - SURFACE WATER
4 - INDUSTRIAL EFFLUENT

TABLE 7-28

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

STATISTICAL SUMMARY FOR 1,3-DICHLOROBENZENE ANALYSES BY WATER TYPE

	WATER 1		WATER 2		WATER 3		WATER 4	
LOW YOUDEN PAIR	1	2	1	2	1	2	1	2
NUMBER OF DATA POINTS	8	9	9	10	9	11	11	11
TRUE CONC (C) UG/L	8.0	7.2	8.0	7.2	8.0	7.2	8.0	7.2
MEAN RECOVERY (X)	10.0	9.5	10.2	12.6	10.3	10.2	11.4	8.1
ACCURACY(%REL ERROR)	24.53	32.41	27.36	74.44	28.89	41.41	42.05	12.25
OVERALL STD DEV (S)	0.4	1.6	2.8	8.3	4.1	2.7	4.9	2.6
OVERALL REL STD DEV, %	3.52	16.36	27.57	66.17	39.72	26.26	43.11	32.59
SINGLE STD DEV, (SR)	0.9		5.9		3.0		3.5	
ANALYST REL DEV, %	9.06		51.87		29.52		36.40	
MEDIUM YOUDEN PAIR	3	4	3	4	3	4	3	4
NUMBER OF DATA POINTS	9	9	10	10	11	11	10	9
TRUE CONC (C) UG/L	120.0	114.0	120.0	114.0	120.0	114.0	120.0	114.0
MEAN RECOVERY (X)	128.1	124.0	127.3	121.8	145.5	127.6	124.2	123.3
ACCURACY(%REL ERROR)	6.77	8.76	6.07	6.80	21.27	11.89	3.50	8.16
OVERALL STD DEV (S)	13.1	28.6	30.6	36.3	17.2	19.8	13.8	17.1
OVERALL REL STD DEV, %	10.26	23.05	24.04	29.79	11.84	15.49	11.11	13.90
SINGLE STD DEV, (SR)	17.5		38.9		17.8		13.3	
ANALYST PEL DEV, %	13.88		31.22		13.01		10.73	
HIGH YOUDEN PAIR	5	6	5	6	5	6	5	6
NUMBER OF DATA POINTS	10	10	9	10	11	10	10	11
TRUE CONC (C) UG/L	432.0	480.0	432.0	480.0	432.0	480.0	432.0	480.0
MEAN RECOVERY (X)	451.1	526.0	382.3	560.2	482.0	491.9	404.8	517.8
ACCURACY(%REL ERROR)	4.42	9.59	-11.50	16.72	11.59	2.49	-6.29	7.87
OVERALL STD DEV (S)	109.2	78.5	69.9	132.4	139.6	51.6	59.6	141.0
OVERALL REL STD DEV, %	24.21	14.93	18.29	23.63	28.97	10.48	14.72	27.22
SINGLE STD DEV, (SR)	66.5		81.7		91.2		100.3	
ANALYST REL DEV, %	13.62		17.33		18.73		21.75	

WATER LEGEND

1 - DISTILLED WATER
2 - TAP WATER
3 - SURFACE WATER
4 - INDUSTRIAL EFFLUENT

REGRESSION ANALYSIS OF BASIC STATISTICS

Systematic relationships can exist between the mean recovery statistics and the prepared concentration levels across ampuls, and between the precision statistics and the mean recovery statistics. Given a plot of precision values versus concentration levels, a smooth curve drawn through the points can show that the precision is found to: (1) be constant and not vary with level; (2) vary directly with level in a linear manner; or (3) vary with level in a curvilinear fashion.

In order to derive statements for method accuracy and precision, the basic statistics were regressed assuming linear relationships, fitting the data to a line using weighted least-squares. The weights were chosen to be inversely related to the prepared concentration in the case of accuracy and inversely related to the mean recovery in the case of precision. The inverse weightings were employed to minimize skewing created by the high Youden-pair data. The results of the regression analyses are discussed below.

Statements of Method Accuracy

The accuracy of Method 624 for each compound is characterized by comparing the mean recovery of the analyte, $\bar{X}$, to the prepared concentration level of the compound, C, in the ampule. The IMVS program conducts these calculations via matrix algebra, where weighted least-squares linear regression of $\bar{X}$ versus C is conducted with weights chosen to be inversely related to the square of the true concentration levels (see Page 108 of Reference 2 for details). This method is equivalent to that suggested by Britton [7] where the linear regression for $\bar{X}$ versus C is achieved by using the customary least-squares algorithm to fit:

$$\frac{\bar{X}}{C} = a + b\left(\frac{1}{C}\right) \qquad (8)$$

which can then be converted to the desired relationships by multiplying through by C, giving:

$$\bar{X} = aC + b \qquad (9)$$

These equations were presented in Table 1 in Section 2 of the report.

If the intercept (b) associated with the fitted line is negligible (i.e., essentially zero), then the slope (a) provides a unique value which represents the percent recovery over all of the concentration levels.

Statements of Method Precision

The precision of Method 624 for each compound is characterized by comparing the overall and single-analyst standard deviations to the mean recovery, $\bar{X}$. The IMVS program conducts these calculations via matrix algebra, where a weighted least-squares linear regression of S and S_r versus $\bar{X}$ is conducted with weights chosen to be inversely proportional to the square of the mean recovery (see Page 108 of Reference 2, for details). This method is equivalent to that suggested by Britton [7] where the linear regressions for S and S_r versus C are achieved by using the customary least-squares procedure to fit the equations

$$\frac{S}{C} = c + d\left(\frac{1}{C}\right) \qquad (10)$$

In this study, however, the regression was conducted versus $\bar{X}$ as follows:

$$\frac{S}{\bar{X}} = c + d\left(\frac{1}{\bar{X}}\right) \qquad (11)$$

which is then converted by multiplying through by $\overline{X}$ to yield the linear relationships

$$S = a\overline{X} + b \tag{12}$$

and

$$S_r = c\overline{X} + d \tag{13}$$

These equations were also presented earlier in Table 1 (Section 2).

If the intercepts, b and d, are negligible, then the slopes, a and c, are estimates of the overall and RSD-SA deviations respectively. These in turn, are measures of the method precision.

COMPARISON OF ACCURACY AND PRECISION ACROSS WATER TYPES

It is possible that the accuracy and precision values of Method 624 depend upon the type of water being analyzed. The summary statistics $\overline{X}$, S, and S_r are calculated separately for each concentration level within each water type. They can be compared across water types in order to obtain information about the effects of water type on accuracy and precision. However, the use of these summary statistics in this manner has several disadvantages. First, it is cumbersome because there are 24 mean recovery statistics ($\overline{X}$) (6 ampules x 4 waters), 24 precision statistics (S), and 12 precision statistics (S_r) calculated for each compound. Comparison of these statistics across concentration levels and across water types becomes unwieldy. Second, the statistical properties of this type of comparison procedure are difficult to determine. Finally, due to variation associated with $\overline{X}$, S, and

S_r, comparisons based on these statistics can lead to inconsistent conclusions about the effect of water type. For example, distilled water may produce a significantly lower value than drinking water for the precision statistic S at a high concentration, but a significantly higher value for S at a low concentration.

An alternative approach, described in detail in Reference 2, has been developed to test for the effects of water type. This alternative approach is based on the concept of summarizing the average effect of water type across concentration levels rather than studying the local effects at each concentration level. If significant differences are established by this alternative technique, then the summary statistics can be used for further local analysis.

Thus, in order to check for the effect of water type on the analytical results, first a global F-test of the accuracy and precision is calculated. If the global F-test shows no water type effects, no further calculations are required. If the F-test shows significance of water type, calculations are performed to determine if the individual differences are statistically significant by calculating a confidence interval for the difference between water type. A statistical significance is established if at least one of the confidence intervals for the differences does not include zero.

The global F-test for the effect of water type is calculated using the following statistical model. If X_{ijk} denotes the measurement reported by laboratory i, for water type j, and ampul k, then

$$X_{ijk} = \beta_j \cdot C_k^{\gamma j} \cdot L_i \cdot \varepsilon_{ijk} \qquad (14)$$

where $i = 1,2, \ldots, 15$
$j = 1,2$
$k = 1,2, \ldots, 6$

Model components β_j and γ_j are fixed parameters that determine the effect of water type j on the behavior of the observed measurements (X_{ijk}). The parameter C_k is the prepared concentration level associated with ampule k. The model component L_i is a random factor which accounts for the systematic error associated with laboratory i. The model component ε_{ijk} is the random factor that accounts for the within-laboratory error.

The model is designed to approximate the global behavior of the data. The multiplicative structure was chosen because of two important properties. First, it allows for a possible curvilinear relationship between the data (X_{ijk}) and the true concentration level (C_k) through the use of the exponent γ_j on C_k. This makes the model more flexible in the data and the concentration level C_k in this model. This property is important because it is typical of interlaboratory data collected under conditions where the true concentration levels vary widely.

Accuracy is related directly to the mean recovery or expected value of the measurements (X_{ijk}). The expected value for the data modeled by Equation 14 is

$$E(X_{ijk}) = \beta_j \cdot C_k^{\gamma j} \cdot E(L_i \cdot \varepsilon_{ijk}) \qquad (15)$$

Precision is related to the variability in the measurements (X_{ijk}). The variance of the data modeled by Equation 14 is

$$\mathrm{Var}(X_{ijk}) = \left[\beta_j \cdot C_k^{\gamma j}\right]^2 \mathrm{Var}(L_i \cdot \varepsilon_{ijk}), \qquad (16)$$

which is an increasing function of C_k. (See Reference 2 for a complete discussion of this model.)

The accuracy and precision of Method 624 depend upon water type through Equations 15 and 16 and the parameters β_j and γ_j. If the β_j and γ_j vary with j (i.e., vary across water type), then the accuracy and precision of the method also vary across water type.

To determine if these parameters do vary across water type and to compare their values, they must be estimated from the laboratory data using regression techniques. Equation 14 represents the basic model. However, taking natural logarithms of both sides of Equation 14, the following straight line regression model is obtained.

$$\ln X_{ijk} = \ln \beta_j + \gamma_j \ln C_k + \ln L_i + \ln \varepsilon_{ijk} \qquad (17)$$

The parameter $\ln \beta_j$ is the intercept, and γ_j is the slope of the regression line associated with water type j. It is assumed that $\ln L_i$ is normally distributed with mean 0 and variance $\sigma_L{}^2$, that $\ln \varepsilon_{ijk}$ is normally distributed with mean 0 and variance $\sigma_\varepsilon{}^2$, and that the $\ln L_i$ and $\ln \varepsilon_{ijk}$ terms are independent.

Based on Equation 17, the comparison of water types reduces to the comparison of straight lines. Distilled water is viewed as a control, and each of the remaining lines is compared directly to the line for distilled water.

Using the data on the log-log scale and regression techniques, the parameter $\ln \beta_j$ (and hence β_j) and γ_j can be estimated. These estimates are then used to formally test the null (no water type effect) versus alternative (water type effect) hypotheses

$$H_0\text{:} \ \ln \beta_j - \ln \beta_1 = 0 \text{ and } \gamma_j - \gamma_1 = 0 \text{ for } j = 2 \qquad (18)$$

versus

$$H_A: \ell n\ \beta_j - \ell n\ \beta_1 \neq 0 \text{ and/or } \gamma_j - \gamma_1 \neq 0 \text{ for some } j = 2 \quad (19)$$

The null hypothesis (H_0) is tested against the alternative hypothesis (H_A) using an F-statistic. The probability of obtaining the value of an F-statistic as large as the value which was actually observed, Prob(F > F OBS), is calculated under the assumption that H_0 is true. H_0 is rejected in favor of H_A if Prob(F > F OBS) is less than 0.05, showing a possible effect due to water type.

If H_0 is not rejected, then there is no evidence in the data that the β_j vary with j or that the γ_j vary with j. Therefore, there is no evidence of an effect due to water type on the accuracy or precision of the method. If H_0 is rejected, then some linear combination of the differences ($\ell n\ \beta_j - \ell n\ \beta$) and ($\gamma_j - \gamma_1$) is statistically different from zero. However, this does not guarantee there will be a statistically significant direct effect attributable to any specific water type since the overall F test can be overly sensitive to minor systematic effects common to several water types. The effect due to a specific water type is judged to be statistically significant only if one of the differences ($\ell n\ \beta_j - \ell n\ \beta_1$) and/or ($\gamma_j - \gamma_1$), is statistically different from zero. This is determined by checking the simultaneous 95% confidence intervals which are constructed for each of these differences. Each true difference can be stated to lie within its respective confidence interval with 95% confidence. If zero is contained within the confindence interval, then there is no evidence that the corresponding difference is significantly different from zero and no further calculations are required.

If at least one of the confidence intervals for the differences ($\ell n\ \beta_j - \ell n\ \beta_1$) or ($\gamma_j - \gamma_1$) fails to include zero, then the statistical significance of the effect due to water type has been established. Even if a statistically significant effect due to water type were to be established, that would not necessarily mean that the effect would be of practical importance. Practical importance is related to the size and interpretation of the differences. The computer generated data for the point estimates, analysis of variance, and confidence intervals are shown in Tables 8-1 through 8-28 for each compound.

The comparison of accuracy and precision across water types just discussed is based on the assumption that Equation 14 approximately models the data. It is clear that in practical monitoring programs of this type such models cannot model the data completely in every case. This analysis therefore is viewed as a screening procedure which identified those cases where differences in water types are likely to be present. A more detailed local analysis can then be pursued using the basic summary statistics for precision and accuracy.

TABLE 8-1

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               ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
                     OFFICE OF RESEARCH AND DEVELOPMENT
                       ENVIRONMENTAL PROTECTION AGENCY

             ** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

                  EFFECT OF WATER TYPE ON BENZENE ANALYSIS

                           ** POINT ESTIMATES **

      DISTILLED WATER SLOPE:GAMMA(1) =  .92766

      WATER    INTERCEPT(WATER-DISTILLED)   SLOPE(WATER-DISTILLED)

        2               -.0764                      .0217
        3               -.0257                      .0045
        4               -.0903                      .0107


                          ** ANALYSIS OF VARIANCE **

           SOURCE            DF    SUM OF SQUARES   MEAN SQUARE    F      PROB

      REG(DISTILLED)           1     603.16613       603.16613
      REG(WATER/DISTILLED)     6        .19586          .03264      .83  .5469
      ERROR                  281      11.04084          .03929

      TOTAL                  288     614.40283


** TABLE OF 95% CONFIDENCE INTERVALS FOR THE DIFFERENCES BETWEEN INTERCEPTS AND THE DIFFERENCES BETWEEN SLOPES **

                 INTERCEPT(WATER-DISTILLED)           SLOPE(WATER-DISTILLED)
      WATER       ESTIMATE       INTERVAL              ESTIMATE      INTERVAL

        2         -.0764  (  -.3483 ,    .1955)     .0217  (  -.0354 ,    .0788)
        3         -.0257  (  -.2889 ,    .2375)     .0045  (  -.0509 ,    .0599)
        4         -.0903  (  -.3657 ,    .1851)     .0107  (  -.0470 ,    .0685)

NOTE:  IF ZERO IS CONTAINED WITHIN A GIVEN CONFIDENCE INTERVAL THEN THERE IS NO STATISTICAL SIGNIFICANCE BETWEEN
       DISTILLED WATER AND THE CORRESPONDING WASTE WATER FOR THE ASSOCIATED PARAMETER(INTERCEPT/SLOPE).

       THE SLOPE AND INTERCEPT ESTIMATES FROM THIS ANALYSIS ARE NOT THE SAME AS THOSE OBTAINED FROM THE PRECISION
       AND ACCURACY REGRESSIONS PERFORMED EARLIER.
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TABLE 8-2

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                ENVIRONMENTAL MONITORING AND SUPPORT LAPORATORY
                      OFFICE OF RESEARCH AND DEVELOPMENT
                       ENVIRONMENTAL PROTECTION AGENCY

                           624 VALIDATION STUDY - PURGEABLES **

                            TYPE ON BROMODICHLOROMETHANE ANALYSIS

                              ** POINT ESTIMATES **

   DI[illegible]         SLOPE:GAMMA(1) = 1.07709

   WATER    [illegible]CEPT(WATER-DISTILLED)   SLOPE(WATER-DISTILLED)

     2               .3794                        -.0607
     3               .1339                        -.0281
     4               .0850                        -.0283


                            ** ANALYSIS OF VARIANCE **

        SOURCE            DF   SUM OF SQUARES  MEAN SQUARE    F     PROB

   REG(DISTILLED)          1    1006.25185     1006.25185
   REG(WATER/DISTILLED)    6       1.41103         .23517    1.90  .0800
   ERROR                 314      38.81922         .12363

   TOTAL                 321    1046.48210


** TABLE OF 95% CONFIDENCE INTERVALS FOR THE DIFFERENCES BETWEEN INTERCEPTS AND THE DIFFERENCES BETWEEN SLOPES **

                   INTERCEPT(WATER-DISTILLED)             SLOPE(WATER-DISTILLED)
   WATER          ESTIMATE        INTERVAL            ESTIMATE       INTERVAL

     2              .3794  ( -.0311 ,    .7899)    -.0607  ( -.1481 ,    .0268)
     3              .1339  ( -.2625 ,    .5303)    -.0281  ( -.1130 ,    .0568)
     4              .0850  ( -.3225 ,    .4924)    -.0283  ( -.1156 ,    .0590)

NOTE:  IF ZERO IS CONTAINED WITHIN A GIVEN CONFIDENCE INTERVAL THEN THERE IS NO STATISTICAL SIGNIFICANCE BETWEEN
       DISTILLED WATER AND THE CORRESPONDING WASTE WATER FOR THE ASSOCIATED PARAMETER(INTERCEPT/SLOPE).

       THE SLOPE AND INTERCEPT ESTIMATES FROM THIS ANALYSIS ARE NOT THE SAME AS THOSE OBTAINED FROM THE PRECISION
       AND ACCURACY REGRESSIONS PERFORMED EARLIER.
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TABLE 8-3

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              ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
                     OFFICE OF RESEARCH AND DEVELOPMENT
                      ENVIRONMENTAL PROTECTION AGENCY

          ** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

                 EFFECT OF WATER TYPE ON BROMOFORM ANALYSIS

                          ** POINT ESTIMATES **

DISTILLED WATER SLOPE:GAMMA(1) = 1.06375

WATER    INTERCEPT(WATER-DISTILLED)   SLOPE(WATER-DISTILLED)

  2                .0030                      .0135
  3              -.0023                     -.0107
  4              -.2483                       .0279


                        ** ANALYSIS OF VARIANCE **

     SOURCE              DF   SUM OF SQUARES  MEAN SQUARE    F      PROB

REG(DISTILLED)            1     858.28306      858.28306
REG(WATER/DISTILLED)      6       1.71032         .28505     1.54  .1658
ERROR                   306      56.78094         .18556


TOTAL                   313     916.77433


** TABLE OF 95% CONFIDENCE INTERVALS FOR THE DIFFERENCES BETWEEN INTERCEPTS AND THE DIFFERENCES BETWEEN SLOPES **

                INTERCEPT(WATER-DISTILLED)          SLOPE(WATER-DISTILLED)
       WATER     ESTIMATE       INTERVAL          ESTIMATE      INTERVAL

         2          .0030  ( -.5456 ,    .5515)     .0135  ( -.1064 ,    .1334)
         3        -.0023  ( -.5380 ,    .5333)   -.0107  ( -.1285 ,    .1072)
         4        -.2483  ( -.7840 ,    .2874)     .0279  ( -.0899 ,    .1458)

NOTE:  IF ZERO IS CONTAINED WITHIN A GIVEN CONFIDENCE INTERVAL THEN THERE IS NO STATISTICAL SIGNIFICANCE BETWEEN
       DISTILLED WATER AND THE CORRESPONDING WASTE WATER FOR THE ASSOCIATED PARAMETER(INTERCEPT/SLOPE).

       THE SLOPE AND INTERCEPT ESTIMATES FROM THIS ANALYSIS ARE NOT THE SAME AS THOSE OBTAINED FROM THE PRECISION
       AND ACCURACY REGRESSIONS PERFORMED EARLIER.
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TABLE 8-4

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           ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
                  OFFICE OF RESEARCH AND DEVELOPMENT
                   ENVIRONMENTAL PROTECTION AGENCY

         ** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

              EFFECT OF WATER TYPE ON BROMOMETHANE ANALYSIS

                        ** POINT ESTIMATES **

DISTILLED WATER SLOPE:GAMMA(1) = 1.04994

WATER    INTERCEPT(WATER-DISTILLED)   SLOPE(WATER-DISTILLED)

  2                 -.2355                       .0300
  3                  .0470                      -.0154
  4                  .0616                      -.0081


                      ** ANALYSIS OF VARIANCE **

     SOURCE           DF    SUM OF SQUARES  MEAN SQUARE    F      PROB

REG(DISTILLED)         1      908.54495      908.54495
REG(WATER/DISTILLED)   6         .81182         .13530     1.17   .3230
ERROR                270       31.24459         .11572


TOTAL                277      940.60136



** TABLE OF 95% CONFIDENCE INTERVALS FOR THE DIFFERENCES BETWEEN INTERCEPTS AND THE DIFFERENCES BETWEEN SLOPES **

                 INTERCEPT(WATER-DISTILLED)           SLOPE(WATER-DISTILLED)
WATER         ESTIMATE        INTERVAL             ESTIMATE        INTERVAL

  2             -.2355  (  -.6731 ,    .2021)     .0300  (  -.0592 ,    .1192)
  3              .0470  (  -.3784 ,    .4724)    -.0154  (  -.1027 ,    .0720)
  4              .0616  (  -.3711 ,    .4942)    -.0081  (  -.0962 ,    .0801)

NOTE:  IF ZERO IS CONTAINED WITHIN A GIVEN CONFIDENCE INTERVAL THEN THERE IS NO STATISTICAL SIGNIFICANCE BETWEEN
       DISTILLED WATER AND THE CORRESPONDING WASTE WATER FOR THE ASSOCIATED PARAMETER(INTERCEPT/SLOPE).

       THE SLOPE AND INTERCEPT ESTIMATES FROM THIS ANALYSIS ARE NOT THE SAME AS THOSE OBTAINED FROM THE PRECISION
       AND ACCURACY REGRESSIONS PERFORMED EARLIER.
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TABLE 8-5

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                    ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
                          OFFICE OF RESEARCH AND DEVELOPMENT
                            ENVIRONMENTAL PROTECTION AGENCY

                   ** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

                  EFFECT OF WATER TYPE ON CARBON TETRACHLORIDE ANALYSIS

                                  ** POINT ESTIMATES **

DISTILLED WATER SLOPE:GAMMA(1) = 1.03467

WATER    INTERCEPT(WATER-DISTILLED)   SLOPE(WATER-DISTILLED)

  2               -.0826
  3                .0888                       .0204
  4               -.0408                      -.0159
                                              -.0004

                            ** ANALYSIS OF VARIANCE **

    SOURCE                DF   SUM OF SQUARES  MEAN SQUARE   F      PROB

REG(DISTILLED)             1     734.19919     734.19919
REG(WATER/DISTILLED)       6        .28468        .04745
ERROR                    275      18.60434        .06765     .70  .6488

TOTAL                    282     753.08822


** TABLE OF 95% CONFIDENCE INTERVALS FOR THE DIFFERENCES BETWEEN INTERCEPTS AND THE DIFFERENCES BETWEEN SLOPES **

                  INTERCEPT(WATER-DISTILLED)            SLOPE(WATER-DISTILLED)
         WATER    ESTIMATE       INTERVAL             ESTIMATE        INTERVAL

           2      -.0826  (  -.4404 ,    .2752)     .0204  (  -.0579 ,    .0987)
           3       .0888  (  -.2487 ,    .4262)    -.0159  (  -.0903 ,    .0586)
           4      -.0408  (  -.3790 ,    .2975)    -.0004  (  -.0753 ,    .0746)

NOTE:  IF ZERO IS CONTAINED WITHIN A GIVEN CONFIDENCE INTERVAL THEN THERE IS NO STATISTICAL SIGNIFICANCE BETWEEN
       DISTILLED WATER AND THE CORRESPONDING WASTE WATER FOR THE ASSOCIATED PARAMETER(INTERCEPT/SLOPE).

       THE SLOPE AND INTERCEPT ESTIMATES FROM THIS ANALYSIS ARE NOT THE SAME AS THOSE OBTAINED FROM THE PRECISION
       AND ACCURACY REGRESSIONS PERFORMED EARLIER.
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TABLE 8-6

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               ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
                     OFFICE OF RESEARCH AND DEVELOPMENT
                      ENVIRONMENTAL PROTECTION AGENCY

             ** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

                 EFFECT OF WATER TYPE ON CHLOROBENZENE ANALYSIS

                           ** POINT ESTIMATES **

DISTILLED WATER SLOPE:GAMMA(1) =  .93776

WATER    INTERCEPT(WATER-DISTILLED)   SLOPE(WATER-DISTILLED)

  2               -.1135                      .0207
  3                .1136                     -.0231
  4               -.0481                     -.0086


                        ** ANALYSIS OF VARIANCE **

     SOURCE             DF   SUM OF SQUARES  MEAN SQUARE   F     PROB

REG(DISTILLED)           1     661.80227     661.80227
REG(WATER/DISTILLED)     6        .66305        .11051     1.83  .0925
ERROR                  305      18.39670        .06032


TOTAL                  312     680.86210


** TABLE OF 95% CONFIDENCE INTERVALS FOR THE DIFFERENCES BETWEEN INTERCEPTS AND THE DIFFERENCES BETWEEN SLOPES **

               INTERCEPT(WATER-DISTILLED)           SLOPE(WATER-DISTILLED)
WATER         ESTIMATE       INTERVAL              ESTIMATE       INTERVAL

  2            -.1135  ( -.4494 ,    .2223)      .0207  ( -.0476 ,    .0890)
  3             .1136  ( -.2143 ,    .4415)     -.0231  ( -.0897 ,    .0436)
  4            -.0481  ( -.3653 ,    .2691)     -.0086  ( -.0734 ,    .0562)

NOTE:  IF ZERO IS CONTAINED WITHIN A GIVEN CONFIDENCE INTERVAL THEN THERE IS NO STATISTICAL SIGNIFICANCE BETWEEN
       DISTILLED WATER AND THE CORRESPONDING WASTE WATER FOR THE ASSOCIATED PARAMETER(INTERCEPT/SLOPE).

       THE SLOPE AND INTERCEPT ESTIMATES FROM THIS ANALYSIS ARE NOT THE SAME AS THOSE OBTAINED FROM THE PRECISION
       AND ACCURACY REGRESSIONS PERFORMED EARLIER.
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TABLE B-7

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                ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
                      OFFICE OF RESEARCH AND DEVELOPMENT
                       ENVIRONMENTAL PROTECTION AGENCY

              ** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

                   EFFECT OF WATER TYPE ON CHLOROETHANE ANALYSIS


                            ** POINT ESTIMATES **

         DISTILLED WATER SLOPE(GAMMA(1)) =  .98284

         WATER    INTERCEPT(WATER-DISTILLED)    SLOPE(WATER-DISTILLED)

           2              -.0910                         .0216
           3               .0866                        -.0102
           4              -.0675                         .0214


                          ** ANALYSIS OF VARIANCE **

             SOURCE            DF    SUM OF SQUARES  MEAN SQUARE    F     PROB

         REG(DISTILLED)          1     948.87213      948.87213
         REG(WATER/DISTILLED)    6        .27657         .04609      .43   .8622
         ERROR                 311      33.56470         .10793

         TOTAL                 318     982.71340


 ** TABLE OF 95% CONFIDENCE INTERVALS FOR THE DIFFERENCES BETWEEN INTERCEPTS AND THE DIFFERENCES BETWEEN SLOPES **

                     INTERCEPT(WATER-DISTILLED)              SLOPE(WATER-DISTILLED)
         WATER       ESTIMATE       INTERVAL                ESTIMATE       INTERVAL

           2          -.0910   ( -.4679 ,   .2862)           .0216   ( -.0578 ,    .1009)
           3           .0866   ( -.2813 ,   .4547)          -.0102   ( -.0897 ,    .0693)
           4          -.0675   ( -.4320 ,   .2969)           .0214   ( -.0570 ,    .0998)

NOTE:  IF ZERO IS CONTAINED WITHIN A GIVEN CONFIDENCE INTERVAL THEN THERE IS NO STATISTICAL SIGNIFICANCE BETWEEN
       DISTILLED WATER AND THE CORRESPONDING WASTE WATER FOR THE ASSOCIATED PARAMETER(INTERCEPT/SLOPE).

       THE SLOPE AND INTERCEPT ESTIMATES FROM THIS ANALYSIS ARE NOT THE SAME AS THOSE OBTAINED FROM THE PRECISION
       AND ACCURACY REGRESSIONS PERFORMED EARLIER.
```

TABLE 8-8

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                    ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
                         OFFICE OF RESEARCH AND DEVELOPMENT
                          ENVIRONMENTAL PROTECTION AGENCY

                  ** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

                      EFFECT OF WATER TYPE ON CHLOROFORM ANALYSIS


                              ** POINT ESTIMATES **

          DISTILLED WATER SLOPE(GAMMA(1)) =  .98507

          WATER     INTERCEPT(WATER-DISTILLED)   SLOPE(WATER-DISTILLED)

            2                .4990                        -.1192
            3                .0588                        -.0223
            6               -.0437                         .0089


                           ** ANALYSIS OF VARIANCE **

             SOURCE           DF   SUM OF SQUARES  MEAN SQUARE    F     PROB

          REG(DISTILLED)        1     750.33668     750.33668
          REG(WATER/DISTILLED)  6       2.08399        .34733     2.66  .0161
          ERROR               274      35.84235        .13081


          TOTAL               281     788.26302



    ** TABLE OF 95% CONFIDENCE INTERVALS FOR THE DIFFERENCES BETWEEN INTERCEPTS AND THE DIFFERENCES BETWEEN SLOPES **

                     INTERCEPT(WATER-DISTILLED)           SLOPE(WATER-DISTILLED)
          WATER      ESTIMATE       INTERVAL              ESTIMATE      INTERVAL

            2          .4990  (  .0915 ,    .9065)     -.1192  (  -.2145 ,   -.0239)
            3          .0588  ( -.3243 ,    .4418)     -.0223  (  -.1126 ,    .0680)
            6         -.0437  ( -.4577 ,    .3704)      .0089  (  -.0843 ,    .1022)

NOTE:  IF ZERO IS CONTAINED WITHIN A GIVEN CONFIDENCE INTERVAL THEN THERE IS NO STATISTICAL SIGNIFICANCE BETWEEN
       DISTILLED WATER AND THE CORRESPONDING WASTE WATER FOR THE ASSOCIATED PARAMETER(INTERCEPT/SLOPE).

       THE SLOPE AND INTERCEPT ESTIMATES FROM THIS ANALYSIS ARE NOT THE SAME AS THOSE OBTAINED FROM THE PRECISION
       AND ACCURACY REGRESSIONS PERFORMED EARLIER.
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TABLE 8-9

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            ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
                  OFFICE OF RESEARCH AND DEVELOPMENT
                   ENVIRONMENTAL PROTECTION AGENCY

        ** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

         EFFECT OF WATER TYPE ON CHLOROMETHANE ANALYSIS


                     ** POINT ESTIMATES **

DISTILLED WATER SLOPE(GAMMA(1)) =  .93207

WATER    INTERCEPT(WATER-DISTILLED)   SLOPE(WATER-DISTILLED)

  2               -.2344                          .0279
  3               -.3817                          .1107
  6               -.4168                          .0653


                  ** ANALYSIS OF VARIANCE **

    SOURCE            DF    SUM OF SQUARES  MEAN SQUARE    F      PROB

REG(DISTILLED)         1     747.61220      747.61220
REG(WATER/DISTILLED)   6       3.83932         .63989     1.37   .2289
ERROR                256     119.96892         .46863


TOTAL                263     871.42043



** TABLE OF 95% CONFIDENCE INTERVALS FOR THE DIFFERENCES BETWEEN INTERCEPTS AND THE DIFFERENCES BETWEEN SLOPES **

                     INTERCEPT(WATER-DISTILLED)           SLOPE(WATER-DISTILLED)
           WATER      ESTIMATE        INTERVAL             ESTIMATE       INTERVAL

             2         -.2344  ( -1.1101 ,    .6414)     .0279  (  -.1580 ,    .2138)
             3         -.3817  ( -1.2259 ,    .4624)     .1107  (  -.0690 ,    .2904)
             6         -.4168  ( -1.2727 ,    .4391)     .0653  (  -.1159 ,    .2466)

NOTE:  IF ZERO IS CONTAINED WITHIN A GIVEN CONFIDENCE INTERVAL THEN THERE IS NO STATISTICAL SIGNIFICANCE BETWEEN
       DISTILLED WATER AND THE CORRESPONDING WASTE WATER FOR THE ASSOCIATED PARAMETER(INTERCEPT/SLOPE).

       THE SLOPE AND INTERCEPT ESTIMATES FROM THIS ANALYSIS ARE NOT THE SAME AS THOSE OBTAINED FROM THE PRECISION
       AND ACCURACY REGRESSIONS PERFORMED EARLIER.
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TABLE 8-10

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                ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
                       OFFICE OF RESEARCH AND DEVELOPMENT
                       ENVIRONMENTAL PROTECTION AGENCY

             ** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

          EFFECT OF WATER TYPE ON CIS-1,3-DICHLOROPROPENE ANALYSIS

                           ** POINT ESTIMATES **

  DISTILLED WATER SLOPE(GAMMA(1)) = 1.00556

  WATER    INTERCEPT(WATER-DISTILLED)   SLOPE(WATER-DISTILLED)

    2               -.0231                      -.0035
    3               .1400                       -.0525
    4               .0145                       -.0052


                      ** ANALYSIS OF VARIANCE **

       SOURCE             DF   SUM OF SQUARES  MEAN SQUARE   F     PROB

  REG(DISTILLED)           1     602.74124      602.74124
  REG(WATER/DISTILLED)     6        .52876         .08813     .79  .5819
  ERROR                  247     [illegible]    [illegible]

  TOTAL                  254     630.97626


** TABLE OF 95% CONFIDENCE INTERVALS FOR THE DIFFERENCES BETWEEN INTERCEPTS AND THE DIFFERENCES BETWEEN SLOPES **

                  INTERCEPT(WATER-DISTILLED)             SLOPE(WATER-DISTILLED)
        WATER      ESTIMATE        INTERVAL              ESTIMATE      INTERVAL

          2         -.0231  ( -.4803 ,   .4341)      -.0035  ( -.1071 ,    .1001)
          3          .1400  ( -.3133 ,   .5932)      -.0525  ( -.1555 ,    .0504)
          4          .0145  ( -.4357 ,   .4648)      -.0052  ( -.1075 ,    .0971)

NOTE:   IF ZERO IS CONTAINED WITHIN A GIVEN CONFIDENCE INTERVAL THEN THERE IS NO STATISTICAL SIGNIFICANCE BETWEEN
        DISTILLED WATER AND THE CORRESPONDING WASTE WATER FOR THE ASSOCIATED PARAMETER(INTERCEPT/SLOPE).

        THE SLOPE AND INTERCEPT ESTIMATES FROM THIS ANALYSIS ARE NOT THE SAME AS THOSE OBTAINED FROM THE PRECISION
        AND ACCURACY REGRESSIONS PERFORMED EARLIER.
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TABLE 8-11

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         ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
              OFFICE OF RESEARCH AND DEVELOPMENT
              ENVIRONMENTAL PROTECTION AGENCY

     ** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

   EFFECT OF WATER TYPE ON DIBROMOCHLOROMETHANE ANALYSIS

                    ** POINT ESTIMATES **

DISTILLED WATER SLOPE:GAMMA(1) = 1.00749

WATER    INTERCEPT(WATER-DISTILLED)   SLOPE(WATER-DISTILLED)

  2                 -.1495                      .0359
  3                  .0283                     -.0056
  4                 -.0350                      .0147


                ** ANALYSIS OF VARIANCE **

    SOURCE              DF   SUM OF SQUARES  MEAN SQUARE   F     PROB

REG(DISTILLED)           1     784.79784     784.79784
REG(WATER/DISTILLED)     6        .23990        .03998      .56  .7608
ERROR                  310      22.07224        .07120


TOTAL                  317     807.10998


** TABLE OF 95% CONFIDENCE INTERVALS FOR THE DIFFERENCES BETWEEN INTERCEPTS AND THE DIFFERENCES BETWEEN SLOPES **

               INTERCEPT(WATER-DISTILLED)         SLOPE(WATER-DISTILLED)
WATER         ESTIMATE        INTERVAL            ESTIMATE       INTERVAL

  2           -.1495  ( -.4682 ,    .1693)      .0359  ( -.0362 ,    .1079)
  3            .0283  ( -.2910 ,    .3477)     -.0056  ( -.0780 ,    .0667)
  4           -.0350  ( -.3664 ,    .2964)      .0147  ( -.0599 ,    .0893)

NOTE:  IF ZERO IS CONTAINED WITHIN A GIVEN CONFIDENCE INTERVAL THEN THERE IS NO STATISTICAL SIGNIFICANCE BETWEEN
       DISTILLED WATER AND THE CORRESPONDING WASTE WATER FOR THE ASSOCIATED PARAMETER(INTERCEPT/SLOPE).

       THE SLOPE AND INTERCEPT ESTIMATES FROM THIS ANALYSIS ARE NOT THE SAME AS THOSE OBTAINED FROM THE PRECISION
       AND ACCURACY REGRESSIONS PERFORMED EARLIER.
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TABLE 8-12

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                ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
                       OFFICE OF RESEARCH AND DEVELOPMENT
                        ENVIRONMENTAL PROTECTION AGENCY

              ** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

                 EFFECT OF WATER TYPE ON ETHYL BENZENE ANALYSIS

                             ** POINT ESTIMATES **

DISTILLED WATER SLOPE:GAMMA(1) =  .94978

WATER    INTERCEPT(WATER-DISTILLED)   SLOPE(WATER-DISTILLED)

  2               .0465                      -.0141
  3               .1472                      -.0240
  4               .1053                      -.0242


                          ** ANALYSIS OF VARIANCE **

    SOURCE            DF   SUM OF SQUARES  MEAN SQUARE   F     PROB

REG(DISTILLED)         1     645.55372     645.55372
REG(WATER/DISTILLED)   6        .19892        .03315     .59  .7412
ERROR                296      16.73581        .05654


TOTAL                303     662.48845



** TABLE OF 95% CONFIDENCE INTERVALS FOR THE DIFFERENCES BETWEEN INTERCEPTS AND THE DIFFERENCES BETWEEN SLOPES **

                INTERCEPT(WATER-DISTILLED)            SLOPE(WATER-DISTILLED)
       WATER     ESTIMATE      INTERVAL             ESTIMATE       INTERVAL

         2         .0465  ( -.2888 ,    .3818)    -.0141  (  -.0802 ,    .0520)
         3         .1472  ( -.1711 ,    .4654)    -.0240  (  -.0870 ,    .0390)
         4         .1053  ( -.2221 ,    .4326)    -.0242  (  -.0888 ,    .0404)

NOTE:  IF ZERO IS CONTAINED WITHIN A GIVEN CONFIDENCE INTERVAL THEN THERE IS NO STATISTICAL SIGNIFICANCE BETWEEN
       DISTILLED WATER AND THE CORRESPONDING WASTE WATER FOR THE ASSOCIATED PARAMETER(INTERCEPT/SLOPE).

       THE SLOPE AND INTERCEPT ESTIMATES FROM THIS ANALYSIS ARE NOT THE SAME AS THOSE OBTAINED FROM THE PRECISION
       AND ACCURACY REGRESSIONS PERFORMED EARLIER.
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TABLE 8-13

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                ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
                      OFFICE OF RESEARCH AND DEVELOPMENT
                        ENVIRONMENTAL PROTECTION AGENCY

               ** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

               EFFECT OF WATER TYPE ON METHYLENE CHLORIDE ANALYSIS


                            ** POINT ESTIMATES **

        DISTILLED WATER SLOPE:GAMMA(1) = 1.01535

        WATER    INTERCEPT(WATER-DISTILLED)   SLOPE(WATER-DISTILLED)

          2                .6189                     -.1231
          3                .7457                     -.1381
          4                .1736                     -.0632


                         ** ANALYSIS OF VARIANCE **

            SOURCE            DF   SUM OF SQUARES  MEAN SQUARE    F     PROB

        REG(DISTILLED)         1     714.95450      714.95450
        REG(WATER/DISTILLED)   6       4.81600         .80267    2.45  .0252
        ERROR                273      89.38194         .32741

        TOTAL                280     809.15244



 ** TABLE OF 95% CONFIDENCE INTERVALS FOR THE DIFFERENCES BETWEEN INTERCEPTS AND THE DIFFERENCES BETWEEN SLOPES **

                     INTERCEPT(WATER-DISTILLED)            SLOPE(WATER-DISTILLED)
        WATER        ESTIMATE        INTERVAL             ESTIMATE       INTERVAL

          2            .6189  (  -.0586 ,   1.2961)     -.1231  (  -.2676 ,    .0213)
          3            .7457  (   .0605 ,   1.4309)     -.1381  (  -.2851 ,    .0089)
          4            .1730  (  -.5451 ,    .8912)     -.0632  (  -.2140 ,    .0876)

NOTE:  IF ZERO IS CONTAINED WITHIN A GIVEN CONFIDENCE INTERVAL THEN THERE IS NO STATISTICAL SIGNIFICANCE BETWEEN
       DISTILLED WATER AND THE CORRESPONDING WASTE WATER FOR THE ASSOCIATED PARAMETER(INTERCEPT/SLOPE).

       THE SLOPE AND INTERCEPT ESTIMATES FROM THIS ANALYSIS ARE NOT THE SAME AS THOSE OBTAINED FROM THE PRECISION
       AND ACCURACY REGRESSIONS PER[illegible]MED EARLIER.
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TABLE 8-14

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               ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
                     OFFICE OF RESEARCH AND DEVELOPMENT
                      ENVIRONMENTAL PROTECTION AGENCY

             ** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

              EFFECT OF WATER TYPE ON TETRACHLOROETHENE ANALYSIS

                         ** POINT ESTIMATES **

DISTILLED WATER SLOPE:GAMMA(1) =  .97206

WATER    INTERCEPT(WATER-DISTILLED)   SLOPE(WATER-DISTILLED)

  2               -.0720                       -.0001
  3                .1188                       -.0303
  4               -.0222                       -.0305


                     ** ANALYSIS OF VARIANCE **

    SOURCE              DF   SUM OF SQUARES  MEAN SQUARE   F     PROB

REG(DISTILLED)           1     651.17994     651.17994
REG(WATER/DISTILLED)     6       1.26364        .21061     4.27  .0004
ERROR                  286      14.10820        .04933


TOTAL                  293     666.55178


** TABLE OF 95% CONFIDENCE INTERVALS FOR THE DIFFERENCES BETWEEN INTERCEPTS AND THE DIFFERENCES BETWEEN SLOPES **

                 INTERCEPT(WATER-DISTILLED)           SLOPE(WATER-DISTILLED)
        WATER     ESTIMATE       INTERVAL            ESTIMATE       INTERVAL

          2        -.0720  (  -.3681 ,    .2242)   -.0001  (  -.0647 ,    .0645)
          3         .1188  (  -.1695 ,    .4070)   -.0303  (  -.0934 ,    .0328)
          4        -.0222  (  -.3105 ,    .2661)   -.0305  (  -.0935 ,    .0326)

NOTE:  IF ZERO IS CONTAINED WITHIN A GIVEN CONFIDENCE INTERVAL THEN THERE IS NO STATISTICAL SIGNIFICANCE BETWEEN
       DISTILLED WATER AND THE CORRESPONDING WASTE WATER FOR THE ASSOCIATED PARAMETER(INTERCEPT/SLOPE).

       THE SLOPE AND INTERCEPT ESTIMATES FROM THIS ANALYSIS ARE NOT THE SAME AS THOSE OBTAINED FROM THE PRECISION
       AND ACCURACY REGRESSIONS PERFORMED EARLIER.
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TABLE 8-15

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                ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
                     OFFICE OF RESEARCH AND DEVELOPMENT
                       ENVIRONMENTAL PROTECTION AGENCY

              ** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

                   EFFECT OF WATER TYPE ON TOLUENE ANALYSIS

                             ** POINT ESTIMATES **

         DISTILLED WATER SLOPE:GAMMA(1) =  .93734

         WATER    INTERCEPT(WATER-DISTILLED)   SLOPE(WATER-DISTILLED)

           2               -.0236                       .0066
           3                .0049                       .0020
           4               -.0293                      -.0043


                          ** ANALYSIS OF VARIANCE **

              SOURCE           DF   SUM OF SQUARES  MEAN SQUARE    F     PROB

         REG(DISTILLED)         1     626.04766     626.04766
         REG(WATER/DISTILLED)   6        .19825        .03304     .80  .5704
         ERROR                285      11.76791        .04129

         TOTAL                292     638.01382


 ** TABLE OF 95% CONFIDENCE INTERVALS FOR THE DIFFERENCES BETWEEN INTERCEPTS AND THE DIFFERENCES BETWEEN SLOPES **

                     INTERCEPT(WATER-DISTILLED)          SLOPE(WATER-DISTILLED)
         WATER       ESTIMATE       INTERVAL            ESTIMATE       INTERVAL

           2          -.0236  (  -.3040 ,    .2568)     .0066  (  -.0506 ,    .0637)
           3           .0049  (  -.2754 ,    .2851)     .0020  (  -.0551 ,    .0591)
           4          -.0293  (  -.3201 ,    .2615)    -.0043  (  -.0634 ,    .0548)

NOTE:  IF ZERO IS CONTAINED WITHIN A GIVEN CONFIDENCE INTFRVAL THEN THERE IS NO STATISTICAL SIGNIFICANCE BETWEEN
       DISTILLED WATER AND THE CORRESPONDING WASTE WATER FOR THE ASSOCIATED PARAMETER(INTERCEPT/SLOPE).

       THE SLOPE AND INTERCEPT ESTIMATES FROM THIS ANALYSIS ARE NOT THE SAME AS THOSE OBTAINED FROM THE PRECISION
       AND ACCURACY REGRESSIONS PERFORMED EARLIER.
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TABLE 8-16

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                    ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
                          OFFICE OF RESEARCH AND DEVELOPMENT
                            ENVIRONMENTAL PROTECTION AGENCY

                   ** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

                 EFFECT OF WATER TYPE ON TRANS-1,2-DICHLOROETHENE ANALYSIS

                                  ** POINT ESTIMATES **

         DISTILLED WATER SLOPE:GAMMA(1) =  .99629

         WATER    INTERCEPT(WATER-DISTILLED)   SLOPE(WATER-DISTILLED)

           2                 -.0891                      .0279
           3                  .0030                     -.0018
           4                 -.0788                      .0105


                              ** ANALYSIS OF VARIANCE **

              SOURCE            DF   SUM OF SQUARES  MEAN SQUARE    F      PROB

         REG(DISTILLED)          1     951.22893      951.22893
         REG(WATER/DISTILLED)    6       .24841         .04140      .78  .5866
         ERROR                 305     16.20177         .05312


         TOTAL                 312     967.67911



** TABLE OF 95% CONFIDENCE INTERVALS FOR THE DIFFERENCES BETWEEN INTERCEPTS AND THE DIFFERENCES BETWEEN SLOPES **

                  INTERCEPT(WATER-DISTILLED)           SLOPE(WATER-DISTILLED)
         WATER     ESTIMATE       INTERVAL            ESTIMATE       INTERVAL

           2        -.0891  (  -.3254 ,    .1473)    .0279  (  -.0282 ,    .0840)
           3         .0030  (  -.2241 ,    .2302)   -.0018  (  -.0558 ,    .0523)
           4        -.0788  (  -.3153 ,    .1576)    .0105  (  -.0456 ,    .0666)

NOTE:   IF ZERO IS CONTAINED WITHIN A GIVEN CONFIDENCE INTERVAL THEN THERE IS NO STATISTICAL SIGNIFICANCE BETWEEN
        DISTILLED WATER AND THE CORRESPONDING WASTE WATER FOR THE ASSOCIATED PARAMETER(INTERCEPT/SLOPE).

        THE SLOPE AND INTERCEPT ESTIMATES FROM THIS ANALYSIS ARE NOT THE SAME AS THOSE OBTAINED FROM THE PRECISION
        AND ACCURACY REGRESSIONS PERFORMED EARLIER.
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TABLE 8-17

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                 ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
                       OFFICE OF RESEARCH AND DEVELOPMENT
                         ENVIRONMENTAL PROTECTION AGENCY

                ** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

            EFFECT OF WATER TYPE ON TRANS-1,3-DICHLOROPROPENE ANALYSIS

                             ** POINT ESTIMATES **

DISTILLED WATER SLOPE:GAMMA(1) =  .96667

WATER    INTERCEPT(WATER-DISTILLED)   SLOPE(WATER-DISTILLED)

  2               -.1816                       .0430
  3                .0600                       .0011
  4               -.0695                       .0251


                          ** ANALYSIS OF VARIANCE **

       SOURCE            DF    SUM OF SQUARES  MEAN SQUARE    F      PROB

REG(DISTILLED)            1      634.36306     634.36306
REG(WATER/DISTILLED)      6         .39463        .06577     1.32   .2493
ERROR                   260       12.97447        .04990

TOTAL                   267      647.73216



** TABLE OF 95% CONFIDENCE INTERVALS FOR THE DIFFERENCES BETWEEN INTERCEPTS AND THE DIFFERENCES BETWEEN SLOPES **

                INTERCEPT(WATER-DISTILLED)           SLOPE(WATER-DISTILLED)
WATER         ESTIMATE        INTERVAL             ESTIMATE        INTERVAL

  2           -.1816  (  -.4780 ,    .1147)        .0430  (  -.0215 ,    .1076)
  3            .0600  (  -.2447 ,    .3648)        .0011  (  -.0654 ,    .0675)
  4           -.0695  (  -.3666 ,    .2276)        .0251  (  -.0399 ,    .0902)

NOTE:  IF ZERO IS CONTAINED WITHIN A GIVEN CONFIDENCE INTERVAL THEN THERE IS NO STATISTICAL SIGNIFICANCE BETWEEN
       DISTILLED WATER AND THE CORRESPONDING WASTE WATER FOR THE ASSOCIATED PARAMETER(INTERCEPT/SLOPE).

       THE SLOPE AND INTERCEPT ESTIMATES FROM THIS ANALYSIS ARE NOT THE SAME AS THOSE OBTAINED FROM THE PRECISION
       AND ACCURACY REGRESSIONS PERFORMED EARLIER.
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TABLE 8-18

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                 ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
                         OFFICE OF RESEARCH AND DEVELOPMENT
                           ENVIRONMENTAL PROTECTION AGENCY

                ** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

                   EFFECT OF WATER TYPE ON TRICHLOROETHENE ANALYSIS

                              ** POINT ESTIMATES **

          DISTILLED WATER SLOPE:GAMMA(1) =  .91194

          WATER    INTERCEPT(WATER-DISTILLED)   SLOPE(WATER-DISTILLED)

            2               -.1326                       .0219
            3                .0597                      -.0180
            4               -.1645                       .0219


                           ** ANALYSIS OF VARIANCE **

               SOURCE            DF   SUM OF SQUARES  MEAN SQUARE    F     PROB

          REG(DISTILLED)          1    720.31055      720.31055
          REG(WATER/DISTILLED)    6       .47045         .07841     1.51  .1762
          ERROR                 273     14.21427         .05207

          TOTAL                 280    734.99528


** TABLE OF 95% CONFIDENCE INTERVALS FOR THE DIFFERENCES BETWEEN INTERCEPTS AND THE DIFFERENCES BETWEEN SLOPES **

                  INTERCEPT(WATER-DISTILLED)             SLOPE(WATER-DISTILLED)
          WATER    ESTIMATE       INTERVAL              ESTIMATE      INTERVAL

            2      -.1326  (  -.3920 ,    .1267)      .0219  (  -.0376 ,    .0814)
            3       .0597  (  -.2004 ,    .3197)     -.0180  (  -.0780 ,    .0421)
            4      -.1645  (  -.4302 ,    .1012)      .0219  (  -.0387 ,    .0824)

NOTE:  IF ZERO IS CONTAINED WITHIN A GIVEN CONFIDENCE INTERVAL THEN THERE IS NO STATISTICAL SIGNIFICANCE BETWEEN
       DISTILLED WATER AND THE CORRESPONDING WASTE WATER FOR THE ASSOCIATED PARAMETER(INTERCEPT/SLOPE).

       THE SLOPE AND INTERCEPT ESTIMATES FROM THIS ANALYSIS ARE NOT THE SAME AS THOSE OBTAINED FROM THE PRECISION
       AND ACCURACY REGRESSIONS PERFORMED EARLIER.
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TABLE 8-19

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                    ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
                          OFFICE OF RESEARCH AND DEVELOPMENT
                            ENVIRONMENTAL PROTECTION AGENCY

                   ** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

                 EFFECT OF WATER TYPE ON TRICHLOROFLUOROMETHANE ANALYSIS

                               ** POINT ESTIMATES **

           DISTILLED WATER SLOPE:GAMMA(1) =  .96739

           WATER    INTERCEPT(WATER-DISTILLED)   SLOPE(WATER-DISTILLED)

             2               -.0626                      .0253
             3               -.0725                     -.0065
             4               -.0378                      .0262


                             ** ANALYSIS OF VARIANCE **

               SOURCE            DF   SUM OF SQUARES  MEAN SQUARE    F     PROB

           REG(DISTILLED)         1     717.92254      717.92254
           REG(WATER/DISTILLED)   6       1.33155         .22192     2.12  .0515
           ERROR                241      25.19791         .10456


           TOTAL                248     744.45200



** TABLE OF 95% CONFIDENCE INTERVALS FOR THE DIFFERENCES BETWEEN INTERCEPTS AND THE DIFFERENCES BETWEEN SLOPES **

                   INTERCEPT(WATER-DISTILLED)            SLOPE(WATER-DISTILLED)
           WATER     ESTIMATE        INTERVAL            ESTIMATE      INTERVAL

             2        -.0626  (  -.4795 ,    .3542)     .0253  (  -.0639 ,    .1145)
             3        -.0725  (  -.4804 ,    .3355)    -.0065  (  -.0944 ,    .0814)
             4        -.0378  (  -.4458 ,    .3701)     .0262  (  -.0617 ,    .1141)

NOTES:  IF ZERO IS CONTAINED WITHIN A GIVEN CONFIDENCE INTERVAL THEN THERE IS NO STATISTICAL SIGNIFICANCE BETWEEN
        DISTILLED WATER [illegible] THE CORRESPONDING WASTE WATER FOR THE ASSOCIATED PARAMETER(INTERCEPT/SLOPE).

        THE SLOPE AND INTERCEPT ESTIMATES FROM THIS ANALYSIS ARE NOT THE SAME AS THOSE OBTAINED FROM THE PRECISION
        AND ACCURACY REGRESSIONS PERFORMED EARLIER.
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TABLE 8-20

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               ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
                      OFFICE OF RESEARCH AND DEVELOPMENT
                       ENVIRONMENTAL PROTECTION AGENCY

              ** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

              EFFECT OF WATER TYPE ON 1,1-DICHLOROETHANE ANALYSIS

                             ** POINT ESTIMATES **

DISTILLED WATER SLOPE:GAMMA(1) =  .98581

WATER    INTERCEPT(WATER-DISTILLED)   SLOPE(WATER-DISTILLED)

  2                -.1156                       .0232
  3                 .0309                      -.0093
  4                -.0851                       .0189


                         ** ANALYSIS OF VARIANCE **

     SOURCE             DF   SUM OF SQUARES  MEAN SQUARE   F     PROB

REG(DISTILLED)           1     725.38816     725.38816
REG(WATER/DISTILLED)     6        .13596        .02266     .52  .7949
ERROR                  293      12.82722        .04378


TOTAL                  300     738.35134


** TABLE OF 95% CONFIDENCE INTERVALS FOR THE DIFFERENCES BETWEEN INTERCEPTS AND THE DIFFERENCES BETWEEN SLOPES **

                  INTERCEPT(WATER-DISTILLED)         SLOPE(WATER-DISTILLED)
         WATER      ESTIMATE       INTERVAL          ESTIMATE       INTERVAL

           2         -.1156  ( -.3946 ,    .1633)     .0232  ( -.0360 ,    .0824)
           3          .0309  ( -.2400 ,    .3019)    -.0093  ( -.0671 ,    .0485)
           4         -.0851  ( -.3472 ,    .1770)     .0189  ( -.0369 ,    .0747)

NOTE:  IF ZERO IS CONTAINED WITHIN A GIVEN CONFIDENCE INTERVAL THEN THERE IS NO STATISTICAL SIGNIFICANCE BETWEEN
       DISTILLED WATER AND THE CORRESPONDING WASTE WATER FOR THE ASSOCIATED PARAMETER(INTERCEPT/SLOPE).

       THE SLOPE AND INTERCEPT ESTIMATES FROM THIS ANALYSIS ARE NOT THE SAME AS THOSE OBTAINED FROM THE PRECISION
       AND ACCURACY REGRESSIONS PERFORMED EARLIER.
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TABLE 8-21

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                 ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
                         OFFICE OF RESEARCH AND DEVELOPMENT
                           ENVIRONMENTAL PROTECTION AGENCY

              ** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

               EFFECT OF WATER TYPE ON 1,1-DICHLOROETHENE ANALYSIS

                            ** POINT ESTIMATES **

DISTILLED WATER SLOPE:GAMMA(1) =  .97621

WATER    INTERCEPT(WATER-DISTILLED)    SLOPE(WATER-DISTILLED)

  2                 .0377                      -.0108
  3                -.0400                      -.0003
  4                -.0236                      -.0106


                          ** ANALYSIS OF VARIANCE **

     SOURCE              DF    SUM OF SQUARES  MEAN SQUARE    F      PROB

REG(DISTILLED)            1     836.99041      836.99041
REG(WATER/DISTILLED)      6        .25286         .04214      .45   .8445
ERROR                   289      27.04424         .09358


TOTAL                   296     864.28751



** TABLE OF 95% CONFIDENCE INTERVALS FOR THE DIFFERENCES BETWEEN INTERCEPTS AND THE DIFFERENCES BETWEEN SLOPES **

              INTERCEPT(WATER-DISTILLED)              SLOPE(WATER-DISTILLED)
WATER          ESTIMATE       INTERVAL              ESTIMATE       INTERVAL

  2              .0377  (  -.3233 ,    .3987)     -.0108  (  -.0878 ,    .0662)
  3             -.0400  (  -.3825 ,    .3025)     -.0003  (  -.0740 ,    .0735)
  4             -.0236  (  -.3761 ,    .3290)     -.0106  (  -.0861 ,    .0648)

NOTE:  IF ZERO IS CONTAINED WITHIN A GIVEN CONFIDENCE INTERVAL THEN THERE IS NO STATISTICAL SIGNIFICANCE BETWEEN
       DISTILLED WATER AND THE CORRESPONDING WASTE WATER FOR THE ASSOCIATED PARAMETER(INTERCEPT/SLOPE).

       THE SLOPE AND INTERCEPT ESTIMATES FROM THIS ANALYSIS ARE NOT THE SAME AS THOSE OBTAINED FROM THE PRECISION
       AND ACCURACY REGRESSIONS PERFORMED EARLIER.
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TABLE 8-22

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                ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
                      OFFICE OF RESEARCH AND DEVELOPMENT
                       ENVIRONMENTAL PROTECTION AGENCY

            ** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

           EFFECT OF WATER TYPE ON 1,1,1-TRICHLOROETHANE ANALYSIS

                          ** POINT ESTIMATES **

         DISTILLED WATER SLOPE:GAMMA(1) =  .98368

         WATER    INTERCEPT(WATER-DISTILLED)   SLOPE(WATER-DISTILLED)

           2                 -.1610                       .0351
           3                 -.0459                      -.0053
           4                 -.0880                      -.0007


                       ** ANALYSIS OF VARIANCE **

             SOURCE            DF   SUM OF SQUARES  MEAN SQUARE    F      PROB

         REG(DISTILLED)          1    714.09659      714.09659
         REG(WATER/DISTILLED)    6       .62005         .10334    2.15  .0482
         ERROR                 297     14.29843         .04814


         TOTAL                 304    729.01507



** TABLE OF 95% CONFIDENCE INTERVALS FOR THE DIFFERENCES BETWEEN INTERCEPTS AND THE DIFFERENCES BETWEEN SLOPES **

                    INTERCEPT(WATER-DISTILLED)          SLOPE(WATER-DISTILLED)
         WATER       ESTIMATE       INTERVAL            ESTIMATE      INTERVAL

           2          -.1610  (  -.4328 ,    .1107)    .0351  (  -.0246 ,    .0947)
           3          -.0459  (  -.3153 ,    .2236)   -.0053  (  -.0643 ,    .0537)
           4          -.0880  (  -.3734 ,    .1974)   -.0007  (  -.0632 ,    .0619)

NOTE:  IF ZERO IS CONTAINED WITHIN A GIVEN CONFIDENCE INTERVAL THEN THERE IS NO STATISTICAL SIGNIFICANCE BETWEEN
       DISTILLED WATER AND THE CORRESPONDING WASTE WATER FOR THE ASSOCIATED PARAMETER(INTERCEPT/SLOPE).

       THE SLOPE AND INTERCEPT ESTIMATES FROM THIS ANALYSIS ARE NOT THE SAME AS THOSE OBTAINED FROM THE PRECISION
       AND ACCURACY REGRESSIONS PERFORMED EARLIER.
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TABLE 8-23

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              ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
                    OFFICE OF RESEARCH AND DEVELOPMENT
                     ENVIRONMENTAL PROTECTION AGENCY

              ** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

             EFFECT OF WATER TYPE ON 1,1,2-TRICHLOROETHANE ANALYSIS

                          ** POINT ESTIMATES **

          DISTILLED WATER SLOPE:GAMMA(1) =  .93957

          WATER    INTERCEPT(WATER-DISTILLED)   SLOPE(WATER-DISTILLED)

            2               -.0548                       .0181
            3                .0071                       .0052
            4               -.1026                       .0185


                         ** ANALYSIS OF VARIANCE **

               SOURCE            DF   SUM OF SQUARES  MEAN SQUARE   F     PROB

          REG(DISTILLED)          1     631.35177      631.35177
          REG(WATER/DISTILLED)    6        .17044         .02841     .79  .5756
          ERROR                 283      10.13074         .03580

          TOTAL                 290     641.65295



 ** TABLE OF 95% CONFIDENCE INTERVALS FOR THE DIFFERENCES BETWEEN INTERCEPTS AND THE DIFFERENCES BETWEEN SLOPES **

                      INTERCEPT(WATER-DISTILLED)          SLOPE(WATER-DISTILLED)
          WATER       ESTIMATE       INTERVAL             ESTIMATE      INTERVAL

            2          -.0548  (  -.3053 ,    .1957)       .0181  (  -.0348 ,    .0710)
            3           .0071  (  -.2469 ,    .2611)       .0052  (  -.0481 ,    .0585)
            4          -.1026  (  -.3526 ,    .1475)       .0185  (  -.0342 ,    .0712)

NOTE:  IF ZERO IS CONTAINED WITHIN A GIVEN CONFIDENCE INTERVAL THEN THERE IS NO STATISTICAL SIGNIFICANCE BETWEEN
       DISTILLED WATER AND THE CORRESPONDING WASTE WATER FOR THE ASSOCIATED PARAMETER(INTERCEPT/SLOPE).

       THE SLOPE AND INTERCEPT ESTIMATES FROM THIS ANALYSIS ARE NOT THE SAME AS THOSE OBTAINED FROM THE PRECISION
       AND ACCURACY REGRESSIONS PERFORMED EARLIER.
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TABLE 8-24

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                 ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
                       OFFICE OF RESEARCH AND DEVELOPMENT
                        ENVIRONMENTAL PROTECTION AGENCY

                ** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

              EFFECT OF WATER TYPE ON 1,1,2,2-TETRACHLOROETHANE ANALYSIS

                              ** POINT ESTIMATES **

          DISTILLED WATER SLOPE:GAMMA(1) =  .96949

          WATER    INTERCEPT(WATER-DISTILLED)   SLOPE(WATER-DISTILLED)

            2                -.0484                      .0100
            3                -.0404                      .0132
            4                -.1351                      .0068


                           ** ANALYSIS OF VARIANCE **

              SOURCE            DF    SUM OF SQUARES  MEAN SQUARE    F      PROB

          REG(DISTILLED)         1      689.72281      689.72281
          REG(WATER/DISTILLED)   6         .77337         .12890    1.58   .1535
          ERROR                295       24.11338         .08174

          TOTAL                302      714.60957


 ** TABLE OF 95% CONFIDENCE INTERVALS FOR THE DIFFERENCES BETWEEN INTERCEPTS AND THE DIFFERENCES BETWEEN SLOPES **

                    INTERCEPT(WATER-DISTILLED)          SLOPE(WATER-DISTILLED)
          WATER      ESTIMATE       INTERVAL           ESTIMATE       INTERVAL

            2         -.0484  ( -.4503 ,    .3534)     .0100  ( -.0691 ,    .0892)
            3         -.0404  ( -.4462 ,    .3654)     .0132  ( -.0667 ,    .0930)
            4         -.1351  ( -.5300 ,    .2598)     .0068  ( -.0711 ,    .0848)

NOTE:  IF ZERO IS CONTAINED WITHIN A GIVEN CONFIDENCE INTERVAL THEN THERE IS NO STATISTICAL SIGNIFICANCE BETWEEN
       DISTILLED WATER AND THE CORRESPONDING WASTE WATER FOR THE ASSOCIATED PARAMETER(INTERCEPT/SLOPE).

       THE SLOPE AND INTERCEPT ESTIMATES FROM THIS ANALYSIS ARE NOT THE SAME AS THOSE OBTAINED FROM THE PRECISION
       AND ACCURACY REGRESSIONS PERFORMED EARLIER.
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TABLE 8-25

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                ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
                       OFFICE OF RESEARCH AND DEVELOPMENT
                        ENVIRONMENTAL PROTECTION AGENCY

               ** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

        EFFECT OF WATER TYPE ON 1,2-DICHLOROBENZENE/1,4-DICHLO ANALYSIS

                            ** POINT ESTIMATES **

        DISTILLED WATER SLOPE:GAMMA(1) =  .92804

        WATER    INTERCEPT(WATER-DISTILLED)   SLOPE(WATER-DISTILLED)

          2                .0039                        .0011
          3                .0852                       -.0242
          4               -.1855                        .0243


                          ** ANALYSIS OF VARIANCE **

            SOURCE            DF   SUM OF SQUARES  MEAN SQUARE   F      PROB

        REG(DISTILLED)         1     548.39153     548.39153
        REG(WATER/DISTILLED)   6        .39824        .06637      .45  .8415
        ERROR                228      33.31188        .14610


        TOTAL                235     582.10165



** TABLE OF 95% CONFIDENCE INTERVALS FOR THE DIFFERENCES BETWEEN INTERCEPTS AND THE DIFFERENCES BETWEEN SLOPES **

                   INTERCEPT(WATER-DISTILLED)          SLOPE(WATER-DISTILLED)
        WATER       ESTIMATE       INTERVAL             ESTIMATE       INTERVAL

          2           .0039  (  -.5953 ,    .6030)     .0011  (  -.1137 ,    .1160)
          3           .0852  (  -.5008 ,    .6712)    -.0242  (  -.1371 ,    .0887)
          4          -.1855  (  -.7584 ,    .3873)     .0243  (  -.0859 ,    .1346)

NOTE:  IF ZERO IS CONTAINED WITHIN A GIVEN CONFIDENCE INTERVAL THEN THERE IS NO STATISTICAL SIGNIFICANCE BETWEEN
       DISTILLED WATER AND THE CORRESPONDING WASTE WATER FOR THE ASSOCIATED PARAMETER(INTERCEPT/SLOPE).

       THE SLOPE AND INTERCEPT ESTIMATES FROM THIS ANALYSIS ARE NOT THE SAME AS THOSE OBTAINED FROM THE PRECISION
       AND ACCURACY REGRESSIONS PERFORMED EARLIER.
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TABLE 8-26

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                    ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
                          OFFICE OF RESEARCH AND DEVELOPMENT
                            ENVIRONMENTAL PROTECTION AGENCY

                   ** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

                   EFFECT OF WATER TYPE ON 1,2-DICHLOROETHANE ANALYSIS

                                ** POINT ESTIMATES **

          DISTILLED WATER SLOPE:GAMMA(1) =  .99176

          WATER    INTERCEPT(WATER-DISTILLED)   SLOPE(WATER-DISTILLED)

            2               -.1183                        .0263
            3                .0565                       -.0143
            4               -.2306                        .0410


                            ** ANALYSIS OF VARIANCE **

               SOURCE            DF   SUM OF SQUARES  MEAN SQUARE    F     PROB

          REG(DISTILLED)          1    742.07064      742.07064
          REG(WATER/DISTILLED)    6       .49305         .08217     1.22  .2944
          ERROR                 300     20.16433         .06721


          TOTAL                 307    762.72802


** TABLE OF 95% CONFIDENCE INTERVALS FOR THE DIFFERENCES BETWEEN INTERCEPTS AND THE DIFFERENCES BETWEEN SLOPES **

                    INTERCEPT(WATER-DISTILLED)             SLOPE(WATER-DISTILLED)
          WATER      ESTIMATE       INTERVAL              ESTIMATE       INTERVAL

            2         -.1183  (  -.4576 ,    .2209)      .0263  (  -.0456 ,    .0985)
            3          .0565  (  -.2742 ,    .3871)     -.0143  (  -.0851 ,    .0566)
            4         -.2306  (  -.5608 ,    .0996)      .0410  (  -.0301 ,    .1121)

NOTE:  IF ZERO IS CONTAINED WITHIN A GIVEN CONFIDENCE INTERVAL THEN THERE IS NO STATISTICAL SIGNIFICANCE BETWEEN
       DISTILLED WATER AND THE CORRESPONDING WASTE WATER FOR THE ASSOCIATED PARAMETER(INTERCEPT/SLOPE).

       THE SLOPE AND INTERCEPT ESTIMATES FROM THIS ANALYSIS ARE NOT THE SAME AS THOSE OBTAINED FROM THE PRECISION
       AND ACCURACY REGRESSIONS PERFORMED EARLIER.
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TABLE 8-27

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                ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
                       OFFICE OF RESEARCH AND DEVELOPMENT
                         ENVIRONMENTAL PROTECTION AGENCY

                ** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

               EFFECT OF WATER TYPE ON 1,2-DICHLOROPROPANE ANALYSIS

                             ** POINT ESTIMATES **

          DISTILLED WATER SLOPE:GAMMA(1) =  .94595

          WATER    INTERCEPT(WATER-DISTILLED)   SLOPE(WATER-DISTILLED)

            2                -.1107                      .0182
            3                 .0782                     -.0135
            4                -.2211                      .0435


                          ** ANALYSIS OF VARIANCE **

              SOURCE            DF   SUM OF SQUARES  MEAN SQUARE   F     PROB

          REG(DISTILLED)         1     630.45804     630.45804
          REG(WATER/DISTILLED)   6        .38563        .06427    1.91  .0787
          ERROR                277       9.30513        .03359

          TOTAL                284     640.14880


 ** TABLE OF 95% CONFIDENCE INTERVALS FOR THE DIFFERENCES BETWEEN INTERCEPTS AND THE DIFFERENCES BETWEEN SLOPES **

                    INTERCEPT(WATER-DISTILLED)         SLOPE(WATER-DISTILLED)
          WATER      ESTIMATE       INTERVAL           ESTIMATE       INTERVAL

            2         -.1107  ( -.3687 ,   .1472)    .0182  ( -.0343 ,   .0708)
            3          .0782  ( -.1782 ,   .3345)   -.0135  ( -.0657 ,   .0386)
            4         -.2211  ( -.4808 ,   .0385)    .0435  ( -.0093 ,   .0962)

NOTE:  IF ZERO IS CONTAINED WITHIN A GIVEN CONFIDENCE INTERVAL THEN THERE IS NO STATISTICAL SIGNIFICANCE BETWEEN
       DISTILLED WATER AND THE CORRESPONDING WASTE WATER FOR THE ASSOCIATED PARAMETER(INTERCEPT/SLOPE).

       THE SLOPE AND INTERCEPT ESTIMATES FROM THIS ANALYSIS ARE NOT THE SAME AS THOSE OBTAINED FROM THE PRECISION
       AND ACCURACY REGRESSIONS PERFORMED EARLIER.
```

TABLE 8-28

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                ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
                      OFFICE OF RESEARCH AND DEVELOPMENT
                       ENVIRONMENTAL PROTECTION AGENCY

              ** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

             EFFECT OF WATER TYPE ON 1,3-DICHLOROBENZENE ANALYSIS

                            ** POINT ESTIMATES **

       DISTILLED WATER SLOPE:GAMMA(1) =  .94951

       WATER    INTERCEPT(WATER-DISTILLED)   SLOPE(WATER-DISTILLED)

         2                .0717                     -.0257
         3                .0234                     -.0019
         4               -.1025                      .0076


                          ** ANALYSIS OF VARIANCE **

           SOURCE             DF   SUM OF SQUARES  MEAN SQUARE   F     PROB

       REG(DISTILLED)          1     615.80299     615.80299
       REG(WATER/DISTILLED)    6        .38115        .06353      .95  .4598
       ERROR                 220      14.70321        .06683

       TOTAL                 227     630.88735


 ** TABLE OF 95% CONFIDENCE INTERVALS FOR THE DIFFERENCES BETWEEN INTERCEPTS AND THE DIFFERENCES BETWEEN SLOPES **

                     INTERCEPT(WATER-DISTILLED)          SLOPE(WATER-DISTILLED)
       WATER          ESTIMATE       INTERVAL            ESTIMATE       INTERVAL

         2              .0717  (  -.2844 ,    .4279)    -.0257  (  -.1017 ,    .0504)
         3              .0234  (  -.3278 ,    .3746)    -.0019  (  -.0767 ,    .0729)
         4             -.1025  (  -.4475 ,    .2425)     .0076  (  -.0663 ,    .0814)

NOTE:  IF ZERO IS CONTAINED WITHIN A GIVEN CONFIDENCE INTERVAL THEN THERE IS NO STATISTICAL SIGNIFICANCE BETWEEN
       DISTILLED WATER AND THE CORRESPONDING WASTE WATER FOR THE ASSOCIATED PARAMETER(INTERCEPT/SLOPE).

       THE SLOPE AND INTERCEPT ESTIMATES FROM THIS ANALYSIS ARE NOT THE SAME AS THOSE OBTAINED FROM THE PRECISION
       AND ACCURACY REGRESSIONS PERFORMED EARLIER.
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SECTION 6

RESULTS AND DISCUSSION

The objective of this study was to characterize the performance of Method 624. Accuracy and precision estimates, expressed as regression equations, were presented in Table 1 of Section 2 for each compound. Table 9 was prepared to facilitate the interpretation of these equations. In Table 9, accuracy (percent recovery), overall precision (percent standard deviation), and single-analyst precision (percent standard deviation) were computed using the regression equations in Table 1. Estimates of accuracy and precision were computed for low and high prepared concentrations of 10 (or 15) and 100 µg/L, respectively. The low level concentrations are approximately equal to the lowest spike level used in the study. Values of the mean recovery, $\overline{X}$, computed as less than zero were set to 1 µg/L to compute the precision estimates. Accuracy and precision estimates computed as less than zero were set to zero.

One measure of the performance of the method is that approximately 15% of the 9,880 data points were rejected as outliers, which is equivalent to rejecting data from two of the fifteen laboratories. The discussion which follows is based on the data set after removing these 1,434 values.

ACCURACY

The accuracy of Method 624 is obtained by comparing the mean recovery, $\overline{X}$, to the prepared values of concentration in µg/L. In the statistical summary Tables 7-1 through 7-28, individual values

TABLE 9. ACCURACY AND PRECISION ESTIMATES FOR LOW- AND HIGH-LEVEL CONCENTRATIONS

COMPOUND	CONC. (UG/L)	DISTILLED WATER			TAP WATER			SURFACE WATER			IND. EFFLUENT		
		%REC	%RSD	%RSD -SA	%REC	%RSD	%RSD -SA	%REC	%RSD	%RSD -SA	%REC	%RSD	%RSD -SA
METHYLENE CHLORIDE	10	104	69	26	133	76	70	166	73	73	102	63	65
	100	83	35	20	79	43	33	89	34	27	74	47	35
TETRACHLOROETHENE	10	112	12	11	105	21	23	117	15	16	103	30	32
	100	107	16	13	99	26	23	104	24	18	89	31	28
TOLUENE	15	112	12	11	116	20	22	115	13	15	110	19	16
	100	100	20	14	101	23	19	102	21	15	95	25	21
TRANS-1,2-DICHLOROETHENE	10	101	20	16	103	22	19	101	20	17	96	24	20
	100	98	19	16	105	17	17	98	16	16	96	23	21
TRANS-1,3-DICHLOROPROPENE	10	82	25	14	77	28	25	96	26	15	81	16	13
	100	80	26	19	82	25	14	90	24	15	82	21	18
TRICHLOROETHENE	10	127	17	16	119	24	20	132	26	22	117	33	28
	100	106	13	13	105	26	23	106	20	15	101	33	23
TRICHLOROFLUOROMETHANE	10	100	31	18	101	30	25	92	31	25	103	23	11
	100	93	35	30	98	31	19	86	31	28	100	27	23
1,1-DICHLOROETHANE	10	109	20	13	102	22	14	110	22	21	108	32	20
	100	99	16	15	101	15	16	100	13	12	104	25	23
1,1-DICHLOROETHENE	10	115	39	27	115	28	31	109	27	23	100	25	19
	100	102	37	23	96	24	18	96	22	15	86	23	23
1,1,1-TRICHLOROETHANE	10	113	18	11	106	21	15	104	20	20	107	19	10
	100	107	21	12	110	23	20	101	27	23	100	23	17
1,1,2-TRICHLOROETHANE	10	112	18	14	120	21	24	119	14	14	110	13	18
	100	97	18	14	104	16	13	106	20	16	101	22	18

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TABLE 9. (Continued)

COMPOUND	CONC. (UG/L)	DISTILLED WATER			TAP WATER			SURFACE WATER			IND. EFFLUENT		
		%REC	%RSD	%RSD -SA	%REC	%RSD	%RSD -SA	%REC	%RSD	%RSD -SA	%REC	%RSD	%RSD -SA
BENZENE	10	113	13	11	109	15	18	113	14	10	105	14	5
	100	95	24	24	96	21	20	96	22	14	91	21	13
BROMODICHLOROMETHANE	10	87	33	22	116	52	25	90	31	23	85	34	21
	100	101	21	16	104	24	18	99	23	18	93	23	23
BROMOFORM	10	92	33	16	102	43	44	90	37	19	79	39	28
	100	100	21	14	112	34	32	96	27	18	93	34	28
BROMOMETHANE	10	64	35	19	58	44	21	64	35	22	68	40	34
	100	71	26	26	68	35	28	68	26	24	75	41	37
CARBON TETRACHLORIDE	10	93	16	15	90	14	14	99	29	26	89	26	17
	100	100	14	11	105	23	22	101	20	17	94	21	20
CHLOROBENZENE	15	113	15	15	116	20	23	120	15	15	108	22	24
	100	100	24	16	104	22	20	104	26	18	94	34	23
CHLOROETHANE	10	123	43	39	111	35	25	127	40	35	116	36	34
	100	110	29	25	110	35	30	111	29	23	112	38	32
CHLOROFORM	10	96	20	18	145	70	26	97	22	19	98	25	17
	100	93	18	16	93	37	23	92	23	22	94	19	14
CHLOROMETHANE	10	118	58	56	92	43	44	106	50	33	98	50	45
	100	96	49	43	90	45	43	111	45	37	102	60	58
CIS-1,3-DICHLOROPROPENE	10	119	25	23	116	32	24	118	29	25	116	25	18
	100	123	24	19	121	27	21	116	32	26	120	25	15
DIBROMOCHLOROMETHANE	10	101	22	15	103	35	21	102	19	16	100	17	14
	100	101	17	17	107	27	23	101	21	20	106	25	18
ETHYL BENZENE	15	115	16	20	119	20	27	127	15	17	126	22	24
	100	100	24	15	102	23	23	105	21	15	105	28	24

TABLE 9. (Continued)

COMPOUND	CONC. (UG/L)	DISTILLED WATER			TAP WATER			SURFACE WATER			IND. EFFLUENT		
		%REC	%RSD	%RSD -SA	%REC	%RSD	%RSD -SA	%REC	%RSD	%RSD -SA	%REC	%RSD	%RSD -SA
1,1,2,2-TETRACHLOROETHANE	15	105	23	20	98	19	18	109	29	21	101	36	29
	100	95	20	17	93	24	16	100	22	15	89	31	36
1,2-/1,4-DICHLOROBENZENE	10	139	21	12	144	27	18	166	39	30	146	59	42
	100	98	29	21	103	36	33	104	31	26	100	33	28
1,2-DICHLOROETHANE	10	106	17	14	102	18	16	111	33	24	98	33	24
	100	102	21	17	106	17	18	102	20	16	101	19	15
1,2-DICHLOROPROPANE	15	131	15	10	127	16	15	137	15	10	120	21	17
	100	120	17	13	118	13	11	121	17	13	122	18	14
1,3-DICHLOROBENZENE	10	123	11	10	140	41	46	130	29	26	121	32	32
	100	108	17	14	106	26	25	113	18	16	105	19	17

of accuracy as percent relative error are listed for each analyte, in each water matrix, and at each of the six concentration levels in that water matrix (three Youden pairs). This results in 24 separate values for each compound for accuracy. The weighted linear regression of mean recovery, $\bar{X}$, versus the prepared concentration level, C, provides values representing the percent recovery over all of the concentration levels. This reduced the evaluation of accuracy to one statement for each of the 28 compounds in each of four waters as presented in Tables 1-1 through 1-7.

As seen in Table 9, the mean recovery (at 100 µg/L) ranges from 68% for bromomethane in the surface water matrix to 123% for cis-1,3-dichloropropene in the distilled water. Overall, recoveries at the 100 µg/L level are very good for all of the water matrices with an average recovery of 100%. The mean recovery for prepared concentrations at a low level (10 or 15 µg/L) range from 58% for bromomethane in the tap water matrix to 166% for methylene chloride and the dichlorobenzene co-eluters in the surface water matrix with an average value of 109%. The differences observed between percent recoveries at the low and high levels are directly related to the absolute magnitude of the intercept term in the regression equations. Bromomethane is a gas in pure form. It is possible that the low recovery observed for bromomethane may be due to inherent difficulties in handling gaseous and extremely volatile compounds during the various preparation and analytical procedures required in the method. Bromomethane is also known to be unstable, which could also account for low recoveries. Some of the greatest percent recovery differences are seen for methylene chloride and the dichlorobenzene co-eluters.

This trend toward higher recoveries (above 100%) for the lowest concentration Youden pairs was observed for a total of 10 compounds. One explanation could be sample contamination from the presence of these compounds in the laboratory. Low level contamination of methylene chloride may be responsible for the higher recovery of the low pair; blank concentrations were also higher for methylene chloride than for many of the other compounds, indicating a greater likelihood of low-level sample contamination. This explanation is less clear for other compounds. For example, the trend is more pronounced for the chlorobenzenes than for benzene or chloroform, yet the latter compounds would be expected to be more ubiquitous in a laboratory environment.

Recoveries for cis-1,3-dichloropropene and 1,2-dichloropropane are relatively high (ranging from 116% to 137%) for all water matrices at both concentration levels. It is known that the isomers of 1,3-dichloropropene are relatively unstable and may decompose to 1,3-dichloropropane. It is difficult to explain the results for these compounds using instability. In theory, trans-1,3-dichloropropene should have greater stability than the cis isomer, yet the recovery of the cis isomer is high while the trans isomer recovery is low. The opposite trend would be expected if decomposition were playing a significant role in the analytical results for these compounds.

PRECISION

The overall and single-analyst precisions of Method 624 were determined as percent relative standard deviations for each analyte, water type, and concentration level. The statistical summary Tables 7-1 through 7-28 present 24 individual values of overall percent relative standard deviation, and 12 individual values of single-analyst percent relative standard deviation, for each compound. The weighted linear regression of standard deviation, S, versus mean recovery, $\overline{X}$, provides values of percent relative standard deviation over all of the concentration ranges. This reduced the evaluation of precision to 112 statements - one for each of the 28 analytes in each of the four water types. These precision statements are presented in Tables 1-1 through 1-7 of Section 2.

The overall standard deviation of the analytical results indicate the dispersion expected among measurements generated from a group of laboratories. This represents the broad variation (reflecting the combined effect of systematic and random errors) in the data collected in the interlaboratory study. As seen in Table 9 the percent relative standard deviation (RSD) at 100 µg/L range from 13% for trichloroethene, 1,1-dichloroethane and 1,2-dichloropropane in the various water matrices to 60% for chloromethane in the industrial effluent with a median value of 24%. Relatively high precision values for chloromethane, chloroethane and bromethane may be due to inherent difficulties in handling gases in the various stages of standard and sample handling. The RSD for low level prepared concentrations of 10 or 15 µg/L ranged from 11% for 1,3-dichlorobenzene in the distilled water to 76% for methylene chloride for the tap water matrix with a median value of 25%. As seen for the percent recovery estimates, differences observed between precision estimates at prepared concentrations of 10 or 15 µg/L and 100 µg/L are directly related to the absolute magnitude of the intercept term in the regression equations. Some of the greatest differences between RSD estimates at the low and high levels are seen for methylene chloride. Precision for chloromethane is relatively poor at both concentration levels for all water matrices with RSDs ranging from 43% to 60%.

The percent standard deviation for a single analyst (RSD-SA) indicates the precision associated within a single laboratory. As seen in Table 9, RSD-SAs at a prepared concentration of 100 µg/L range from 11% for carbon tetrachloride (distilled water matrix) and 1,2-dichloropropane (tap water matrix) to 58% for chloromethane in the industrial effluent with a median value of 19%. The RSD-SA for prepared concentrations at 10 or 15 µg/L range from 5% for benzene for the industrial effluent to 73% for methylene chloride for the surface water matrix. The magnitudes of the intercept term in the four regression equations for methylene chloride are responsible for the wide range of values for RSD-SA. Some of the greatest RSD-SA differences at the low and high levels are observed for methylene chloride. Single-analyst precision for chloromethane is relatively poor at both concentration levels with RSD-SAs ranging from 33% to 58%.

EFFECTS OF WATER TYPES

The comparison of accuracy and precision across water types was presented in Table 8-1 through 8-28 and is summarized in Table 10. The observed F values are entered for each of the 28 volatile organic analytes. The F-test suggests a possible effect due to water type in 4 of the 28 cases. Although statistical significance is indicated by the F-test, the null hypothesis test for two of the four compounds indicated that a significant effect due to water type has not been established because zero is contained within the confidence intervals for both the differences between intercepts and the differences between slopes.

Practical significance was based on an examination of several factors in addition to the results of the statistical tests. These factors included the regression equations for accuracy and precision, the statistical summaries of the data, and the point estimates of accuracy and precision at low and high levels of prepared concentration. A practical effect due to water is indicated from the analysis and examination of these factors for both chloroform and methylene chloride. The slope and intercept

TABLE 10. SUMMARY OF THE TESTS FOR DIFFERENCES ACROSS WATER TYPES

Compound	Observed F-Value	F-Test Significant at the 5% Level?	Statistical Significance Established by the 95% Confidence Limits?	Significant Water Type	Practical Significance
Benzene	0.83	No			
Bromodichloromethane	1.90	No			
Bromoform	1.54	No			
Bromomethane	1.17	No			
Carbon tetrachloride	0.70	No			
Chlorobenzene	1.83	No			
Chloroethane	0.43	No			
Chloroform	2.66	Yes	Yes	Tap	Yes
Chloromethane	1.37	No			
CIS-1,3-dichloropropene	0.79	No			
Dibromochloromethane	0.56	No			
Ethyl benzene	0.59	No			
Methylene chloride	2.45	Yes	Yes	Surface	Yes
Tetrachloroethene	4.27	Yes	No		
Toluene	0.80	No			
Trans-1,2-dichloroethene	0.78	No			
Trans-1,3-dichloropropene	1.32	No			
Trichloroethene	1.51	No			
Trichlorofluoromethane	2.12	No			
1,1-Dichloroethane	0.52	No			
1,1-Dichloroethene	0.45	No			
1,1,1-Trichloroethane	2.15	Yes	No		
1,1,2-Trichloroethane	0.79	No			
1,1,2,2-Tetrachloroethane	1.58	No			
1,2-Dichlorobenzene/1,4-Dichlorobenzene	0.45	No			
1,2-Dichloroethane	1.22	No			
1,2-Dichloropropane	1.91	No			
1,3-Dichlorobenzene	0.95	No			

estimates for chloroform in the tap water matrix were significantly different from the estimates for the distilled water. For methylene chloride, the intercept estimate for the surface water matrix was significantly larger than the intercept term for the distilled water. A review of the point estimates, statistical summaries and regression equations for accuracy and precision indicate the following:

- the recovery at low level concentrations are high for both analytes,
- the overall RSD for chloroform in tap water is high at all concentration levels, and
- the single-analyst RSD for methylene chloride in surface water is high at low level concentrations.

High recoveries and precision values for methylene chloride and chloroform (in tap water) may be due to background contamination. Relatively high recoveries for the low level Youden pairs would be expected as a result of low level sample contamination. High blank values for methylene chloride also indicate the probability of sample contamination for that compound (see Appendix C, Tables C-83 thru C-88).

COMPARISON OF PUBLISHED METHOD PERFORMANCE DATA TO INTERLABORATORY STUDY DATA

Table 11 compares the accuracy and single analyst precision results from this interlaboratory study to the method performance results for Method 624 [8]. The accuracy and precision values listed for the method performance data represent the results

TABLE 11. COMPARISON OF ACCURACY AND PRECISION OF INTERLABORATORY STUDY DATA (FOR A PREPARED CONCENTRATION OF 100 μg/L) AND PUBLISHED METHOD PERFORMANCE DATA

		Reagent Water*		Wastewater**	
Compound	Data Source	% Recovery	% RSD-SA	% Recovery	% RSD-SA
Benzene	Method Perf.	99	9	98	10
	Inter. Study	95, 96	24, 20	96, 91	14, 13
Bromodichloromethane	Method Perf.	102	12	103	10
	Inter. Study	101, 104	16, 18	99, 93	18, 23
Bromoform	Method Perf.	104	14	105	16
	Inter. Study	100, 112	14, 32	96, 93	18, 28
Bromomethane	Method Perf.	100	20	88	23
	Inter. Study	71, 68	26, 28	68, 75	24, 37
Carbon Tetrachloride	Method Perf.	102	16	104	15
	Inter. Study	100, 105	11, 22	101, 94	17, 20
Chlorobenzene	Method Perf.	100	7	102	9
	Inter Study	100, 104	16, 20	104, 94	18, 23
Chloroethane	Method Perf.	97	22	103	31
	Inter. Study	93, 93	16, 23	92, 94	22, 14
Chloroform	Method Perf.	101	10	101	12
	Inter. Study	96, 90	43, 43	111, 102	37, 58
CIS-1,3-dichloropropene	Method Perf.	105	15	102	19
	Inter. Study	123, 121	19, 21	116, 120	26, 15
Dibromochloromethane	Method Perf.	103	11	104	14
	Inter. Study	101, 107	17, 23	101, 106	20, 18
Ethyl benzene	Method Perf.	100	8	103	10
	Inter. Study	100, 102	15, 23	105, 105	15, 24
Methylene chloride	Method Perf.	96	16	89	28
	Inter Study.	83, 79	20, 23	89, 74	27, 35

(Continued)

TABLE 11. (Continued)

Compound	Data Source	Reagent Water*		Wastewater**	
		% Recovery	% RSD-SA	% Recovery	% RSD-SA
Tetrachloroethene	Method Perf.	101	9	100	11
	Inter. Study	107, 99	13, 23	104, 89	18, 28
Toluene	Method Perf.	101	9	98	14
	Inter. Study	100, 101	14, 19	102, 95	15, 21
Trans-1,2-dichloroethene	Method Perf.	99	12	101	10
	Inter. Study	98, 105	16, 17	98, 96	16, 21
Trans-1,3-dichloropropene	Method Perf.	104	11	100	18
	Inter. Study	80, 82	19, 14	90, 82	15, 18
Trichloroethene	Method Perf.	101	9	100	12
	Inter. Study	106, 105	13, 23	106, 101	15, 23
Trichlorofluoromethane	Method Perf.	103	11	107	19
	Inter. Study	93, 98	30, 19	86, 100	28, 23
1,1-Dichloroethane	Method Perf.	101	10	104	15
	Inter. Study	99, 101	15, 16	100, 104	12, 23
1,1-Dichloroethene	Method Perf.	102	17	99	15
	Inter. Study	102, 96	23, 18	96, 86	15, 23
1,1,1-Trichloroethane	Method Perf.	101	11	102	16
	Inter. Study	107, 110	12, 20	101, 100	23, 17
1,1,2-Trichloroethane	Method Perf.	101	10	104	15
	Inter. Study	97, 104	14, 13	106, 101	16, 18
1,1,2,2-Tetrachloroethane	Method Perf.	102	9	104	14
	Inter. Study	95, 93	17, 16	100, 89	15, 36
1,2-Dichloroethane	Method Perf.	100	8	102	10
	Inter. Study	102, 106	17, 18	102, 101	16, 15
1,2-Dichloropropane	Method Perf.	102	8	103	12
	Inter. Study	120, 118	13, 11	121, 122	13, 14

* The two values given for the reagent water validation data in each column represent the distilled and tap waters, respectively.

** The two values given for the wastewater validation data in each column represent the surface water and industrial effluent, respectively.

from two to four laboratories. The values listed for the interlaboratory study were computed at a prepared concentration of 100 µg/L after removing approximately 15% of the reported values as outliers.

REVISED EQUATIONS

A review of the data remaining after the IMVS outlier screening indicated some potential problems with the data for nine of the volatile organic compounds. For these compounds, results for ampule four were out-of-line (usually due to extremely low recoveries) with the remaining data. It is suspected that during production of ampule concentrate four, these volatile compounds were lost. The data for these medium level ampules were eliminated, and the equations revised. Table 12 presents the revised equations and Table 13 presents the revised accuracy and precision estimates for these compounds.

Four compounds in addition to those listed in Table 13 had questionable regression equations although the equations were not revised. These were bromomethane, cis and trans 1,3-dichloropropene and 1,2-dichloropropane. Bromomethane exhibited poor recoveries which may have been due to its extreme volatility or to its reactivity. The dichloropropenes are known to be unstable and to form dichloropropane upon decomposition. Problems with these compounds were also encountered with EPA Quality Control Samples and in the Interlaboratory Study for Method 601 - Halogenated Purgeables by GC.

RESPONSES TO QUESTIONNAIRE

A questionnaire for Method 624 was provided for all participating laboratories. Each of the 15 laboratories responded to the questionnaire. The responses are summarized below.

TABLE 12. REVISED REGRESSION EQUATIONS FOR ACCURACY AND PRECISION

Water Type	Bromoform	Carbon Tetrachloride	Chloroethane
Applicable Conc. Range (μg/L)	(9.0 - 400)	(9.0 - 400)	(7.3 - 488)
Distilled			
Single-Analyst Precision	$SR = 0.12X + 0.36$	$SR = 0.12X + 0.25$	$SR = 0.14X + 2.78$
Overall Precision	$S = 0.17X + 1.38$	$S = 0.11X + 0.37$	$S = 0.29X + 1.75$
Accuracy	$X = 1.18C - 2.35$	$X = 1.10C + 1.68$	$X = 1.18C + 0.81$
Tap Water			
Single-Analyst Precision	$SR = 0.23X + 2.06$	$SR = 0.18X - 0.53$	$SR = 0.29X - 0.52$
Overall Precision	$S = 0.33X + 1.01$	$S = 0.20X - 0.61$	$S = 0.34X + 0.13$
Accuracy	$X = 1.32C - 2.74$	$X = 1.18C - 2.66$	$X = 1.17C - 0.37$
Surface Water			
Single-Analyst Precision	$SR = 0.14X + 0.38$	$SR = 0.15X + 1.07$	$SR = 0.25X + 1.37$
Overall Precision	$S = 0.24X + 1.08$	$S = 0.18X + 0.98$	$S = 0.28X + 1.46$
Accuracy	$X = 1.10C - 1.80$	$X = 1.07C - 0.73$	$X = 1.12C + 1.63$
Industrial Effluent			
Single-Analyst Precision	$SR = 0.18X + 0.65$	$SR - 0.19X - 0.23$	$SR = 0.32X + 0.25$
Overall Precision	$S = 0.25X + 1.02$	$S = 0.19X + 0.59$	$S = 0.40X - 0.37$
Accuracy	$X = 1.06C - 2.67$	$X = 1.00C - 1.07$	$X = 1.24C - 0.41$

X = Mean Recovery

C = Prepared Concentration

(Continued)

TABLE 12. (Continued)

Water Type	Chloromethane	Methylene Chloride	Trans-1,2-Dichloroethene
Applicable Conc. Range (μg/L)	(7.0 - 469)	(7.2 - 480)	(4.5 - 300)
Distilled			
Single-Analyst Precision	$SR = 0.37X + 2.14$	$SR = 0.15X + 1.07$	$SR = 0.14X + 0.09$
Overall Precision	$S = 0.58X + 0.43$	$S = 0.32X + 4.00$	$S = 0.19X + 0.17$
Accuracy	$X = 1.03C + 1.81$	$X = 0.87C + 1.88$	$X = 1.15C + 0.03$
Tap Water			
Single-Analyst Precision	$SR = 0.38X + 0.40$	$SR = 0.20X + 4.96$	$SR = 0.11X + 0.49$
Overall Precision	$S = 0.55X - 0.79$	$S = 0.38X + 5.19$	$S = 0.15X + 0.60$
Accuracy	$X = 0.96C - 0.20$	$X = 0.78C + 5.66$	$X = 1.11C - 0.40$
Surface Water			
Single-Analyst Precision	$SR = 0.32X - 0.05$	$SR = 0.27X + 8.17$	$SR = 0.17X + 0.04$
Overall Precision	$S = 0.49X + 0.27$	$S = 0.29X + 7.48$	$S = 0.15X + 0.40$
Accuracy	$X = 1.23C - 1.31$	$X = 0.83C + 8.40$	$X = 1.02C + 0.05$
Industrial Effluent			
Single-Analyst Precision	$SR = 0.61X - 1.43$	$SR = 0.30X + 3.56$	$SR = 0.26X - 0.29$
Overall Precision	$S = 0.58X - 0.95$	$S = 0.42X + 2.06$	$S = 0.19X + 0.22$
Accuracy	$X = 1.13C - 1.23$	$X = 0.80C + 2.50$	$X = 1.02C - 0.23$

X = Mean Recovery

C = Prepared Concentration

(Continued)

TABLE 12. (Continued)

Water Type	Trichlorofluoromethane	1,1-Dichloroethane	1,1-Dichloroethene
Applicable Conc. Range (μg/L)	(7.2 - 480)	(10.8 - 480)	(7.2 - 480)
Distilled			
Single-Analyst Precision	SR = 0.33X - 1.48	SR = 0.13X - 0.05	SR = 0.17X + 1.06
Overall Precision	S = 0.34X - 0.39	S = 0.16X + 0.47	S = 0.43X - 0.22
Accuracy	X = 0.99C + 0.39	X = 1.05C + 0.36	X = 1.12C + 0.61
Tap Water			
Single-Analyst Precision	SR = 0.17X + 0.80	SR = 0.14X - 0.08	SR = 0.12X + 2.08
Overall Precision	S = 0.29X + 0.04	S = 0.14X + 0.82	S = 0.24X + 0.53
Accuracy	X = 1.05C - 0.19	X = 1.07C - 0.53	X = 1.02C + 1.43
Surface Water			
Single-Analyst Precision	SR = 0.33X - 0.57	SR = 0.11X + 1.08	SR = 0.16X + 0.87
Overall Precision	S = 0.31X + 0.03	S = 0.12X + 1.12	S = 0.24X + 0.51
Accuracy	X = 0.87C + 0.50	X = 1.02C + 0.76	X = 1.01C + 0.91
Industrial Effluent			
Single-Analyst Precision	SR = 0.27X + 1.62	SR = 0.23X - 0.27	SR = 0.24X - 0.39
Overall Precision	S = 0.26X - 0.43	S = 0.21X + 1.12	S = 0.20X + 0.39
Accuracy	X = 1.07C - 0.29	X = 1.09C - 0.12	X = 0.93C + 0.94

X = Mean Recovery

C = Prepared Concentration

TABLE 13. REVISED ACCURACY AND PRECISION ESTIMATES FOR 100 ppb CONCENTRATION LEVELS

COMPOUND	DISTILLED WATER			TAP WATER			SURFACE WATER			IND. EFFLUENT		
	%REC	%RSD	%RSD -SA	%REC	%RSD	%RSD -SA	%REC	%RSD	%RSD -SA	%REC	%RSD	%RSD -SA
BROMOFORM	116	18	12	129	34	25	108	25	14	103	26	19
CARBON TETRACHLORIDE	108	11	2	115	19	13	106	19	16	95	20	19
CHLOROETHANE	119	30	16	117	34	29	114	29	26	124	40	32
CHLOROMETHANE	149	43	38	96	54	38	122	49	32	112	57	60
METHYLENE CHLORIDE	69	37	16	84	44	31	91	37	36	83	44	34
TRANS-1,2-DICHLOROETHENE	105	19	14	111	16	11	102	15	17	102	19	26
TRICHLOROFLUOROMETHANE	95	34	32	105	29	16	87	31	32	107	26	35
1,1-DICHLOROETHANE	105	16	13	106	15	14	103	13	12	109	22	23
1,1-DICHLOROETHENE	113	43	18	103	25	14	102	25	17	94	20	24

METHOD 624

Instrument and calibration parameters are summarized in Table 14. Of the 15 participating laboratories, 11 used Finnigan GC-MS systems. The models used were: OWA 20; OWA 30; OWA 30B; OWA 1020; 3200; 4021; and 4023. Four laboratories used Hewlett-Packard instruments (Models 5981, 5985, and 5985A). Ages were in the range of one to five years for 10 of the instruments and six to 12 years for the remaining 5. Two laboratories specified commercial purge and trap apparatus, a Tekmar LSC-3 and an HP 7675A. With one exception, 1% SP-1000 columns were used. Carbopack B was specified as the solid support by 10 of the laboratories. One laboratory used a 0.3% Carbowax 20M on 80/100 Carbopack C column. The temperature programs used were typically 45°C for 3 to 4 minutes and 8°C/minute to 220°C with exceptions as noted in Table 14.

Calibration standards were obtained primarily or exclusively from Supelco by 10 of the laboratories, with some laboratories specifying additional sources such as Aldrich, J. T. Baker and Chem Service. Four laboratories prepared standards from neat compounds. Three specified Chem Service as the supplier. Information on standard sources was inadvertently omitted by one laboratory. Calibration curves contained three points for 10 laboratories while four-point and five-point curves by 2 laboratories each. All laboratories used the internal standard technique.

Seven laboratories encountered no problems with the calibration procedures. Four laboratories reported difficulties in meeting bromofluorobenzene (BFB) instrument tuning criteria. One of these laboratories recommended using FC-43 for tuning. Five laboratories, including one of the above, had difficulty meeting

TABLE 14. SUMMARY OF INSTRUMENT AND CALIBRATION PARAMETERS

Lab Code	Instrument Make	Age (Yr)	Column	Column Conditions	Primary Source of Standards	Calibration Points (μg/L)
1	Finnigan OWA-20	2.5	6'; 1% SP-1000 on 60/80 Carbopack B	45°C for 3 min; 8°C/min to 220°C; hold at 220°C	Supelco (purgeable gases prepared in-house)	10, 40, 120
2	Finnigan OWA-1020	1	6'x2 mm ID; 1% SP-1000 on 60/80 Carbopack B	45°C for 4 min; 8°C/min to 220°C	Supelco	40, 80, 160
3	Finnigan 4023	5	1% SP-1000 on 60/80 Carbopack B	Ambient for 4 min; 50°C - 200°C at 8°C/min; hold at 200°C	Prepared inhouse	10, 50, 100
4	Hewlett-Packard 5985A + 7675A purge and trap sampler	4.5	8'x1/8" OD SS; 1% SP-1000 in 60/80 Carbopack B	45°C for 3 min; 8°C/min to 220°C; 220°C for 15 min	Supelco	20-50, 250, 500
5	Hewlett-Packard 5981	8	6'x2 mm ID glass; 1% SP-1000	45°C for 4 min; 8°C/min to 220°C; 220°C for 30 min	Supelco	30, 45, 60, 90
6	Finnigan 4021	5	6'x2 mm ID SS; 1% SP-1000	45°C for 3 min; 8°C/min to 220°C	Not specified	25, 100, 200
7	Finnigan OWA-30B	2	6'x2 mm ID glass; 1% SP-1000 on 60/80 Carbopack B	45°C for 3 min; 8°C/min to 220°C; 220°C for 25 min	Prepared inhouse	25, 50, 100
8	Finnigan 3200	5	6'; 1% SP-1000 on Carbopack B	50°C; 10°C/min to 220°C	Supelco	10, 50, 200
9	Hewlett-Packard 5985A	5	6'x2 mm ID glass; 1% SP-1000 on 60/80 Carbopack B	45°C for 3 min; 8°C/min to 220°C	Supelco	2, 20, 50, 100, 200
10	Finnigan OWA-30	2	1% SP-1000	65°C for 3 min; 8°C/min to 245°C	Supelco	10, 20, 200
11	Finnigan 4021	2	0.3% Carbowax 20 M on 80/100 Carbopack C	30°C for 2.5 min; 10°C/min to 220°C; 225°C for 5 min	Prepared inhouse	10, 30, 100, 300
12	Hewlett Packard 5985 + Tekmar LSC-3	6	1% SP-1000 on Carbopack B	45°C for 3 min; 8°C/min to 220°C	Supelco and Analabs	2-200 (5 points)
13	Finnigan 3200	7	6'x2 mm ID glass; 1% SP-1000	Ambient for 1 min; 60°C for 1 min; 8°C/min to 220°C	Supelco	Assumed 3 points[1]
14	Finnigan OWA-1020	1	6' glass; 10% SP-1000 on Carbopack B	45°C for 3 min; 8°C/min to 220°C	Prepared inhouse Chem Service Compounds	3.2-74, 6.3-141, 63-1410, 320-7010
15	Finnigan 3200	2.5	10% SP-1000 on Carbopack B	45°C for 3 min, 8°C/min to 220°C; 220°C for 15 min	Supelco	20, 50, 100

[1] Questionnaire stated dilutions were performed as specified in the method.

daily linearity criteria. Two laboratories reported difficulty in calibrating for the dichlorobenzenes (DCB) due to coelution.

QA/QC measures are summarized in Table 15 and included surrogate control charts (seven laboratories) system blanks using reagent water (all laboratories), duplicate analyses (seven laboratories) replicate injections (three laboratories) and check standards (eleven laboratories).

Additional QA/QC measures included statistical data comparisons, comparison of surrogate recoveries to predetermined control limits (two laboratories), additional sample spiking (two laboratories) and spiking of all samples with BFB.

No QA/QC problems were encountered by 11 of the laboratories. One laboratory complained of an insufficient volume of spiking solution for duplicate analyses. One laboratory found that surrogate recoveries varied due to on-column injection variability of standards and recommended spiking surrogate standards into reagent water. One laboratory reported the loss of the highly volatile gases in standards. One laboratory reported background problems with methylene chloride, benzene, toluene and tetrachloroethene.

Six of the laboratories reported difficulties with sample purging and concentrating. These included:

- The loss of 2-chloroethylvinyl ether in the Tekmar purge and trap apparatus, remedied by replacement of a six-port valve;

- Contamination by the sample for false positives and false negatives and high-level surrogates requiring extended system bakeout;

TABLE 15. SUMMARY OF QA/QC PROCEDURES

Lab Code	Surrogate Control Charts	System Blanks	Duplicate Analyses	Replicate Injections	Check Standards
1	NP	Daily	10% of samples	NP	NP
2	Each sample	Daily	NP	As required	Daily
3	Daily	Twice daily	As required	NP	Daily
4	NP	Daily	NP	NP	Daily
5	Daily	Daily	NP	NP	NP
6	NP	After standards and high samples	As required	NP	Daily
7	Each sample	Daily and after high samples	15% of samples	NP	Quarterly
8	NP	Each shift	NP	As required (2-3 times)	Each shift
9	Daily	Daily	NP	NP	Daily
10	NP	3/day	Daily	NP	Weekly
11	On-going	Daily	NP	NP	NP
12	NP	Daily	20%	NP	Daily
13	NP	Daily and as required	NP	NP	Daily
14	Daily	Daily	NP	Daily	NP[1]
15	NP	After standards and high samples	10%	NP	Each 8 hours

NP = not performed

[1] Specified new curve daily

- Foaming of the "hard-to-analyze" sample (two laboratories); and

- Loss of the early eluting gases (three laboratories).

Instrument problems were restricted to short downtimes experienced by two laboratories with no subsequent effects on analyses, and saturation of the electron multiplier experienced by two laboratories, requiring sample dilution.

A number of laboratories experienced difficulties with interferences including:

- Methylene chloride interferences including a high concentration in the industrial effluent requiring dilution, a concentration in the surrogate solution at a level of approximately 10% of the surrogate concentrations and as an interferent in all analyses (three laboratories);

- Background levels of compounds of interest in the different water types;

- Interferences with the second and third internal standard peaks in high level samples;

- High concentrations of unlabeled compounds resulting in high recoveries of their labeled analogs and vice versa.

Problems with peak identification included difficulties in resolving the DCB isomers (seven laboratories) and difficulty in detecting 2-chloroethylvinyl ether (five laboratories). Two laboratories reported that 2-chloroethylvinyl ether coelutes with 2-bromo-1-chloropropane, an internal standard. One laboratory detected the compound in standards but not samples, while one laboratory could not detect it in standards or samples. One laboratory reported a low intensity of m/e = 106 and interference at m/e = 63 as the problem. One laboratory also reported difficulty in identifying tetrachloroethene in the presence of high tetrachloroethane.

Miscellaneous analytical problems included the absence of one or more key ions in low-concentration samples, high surrogate concentrations requiring dilution and compound responses above the linear range of the instrument.

Recommendations were made by 12 laboratories for improving Method 624. These included:

- Using a fused silica capillary column instead of the specified packed column to increase sensitivity and improve chromatography (two laboratories);
- Using FC-43 to tune the GC-MS system;
- Restricting the analysis of dichlorobenzenes to Method 625 (three laboratories);
- Preparing surrogate solutions and standard dilutions in methanol to diminish stability problems by allowing freezer storage (two laboratories);

- Starting the spectral scan at 35 amu rather than 20 amu since the range of 20 amu - 35 amu does not provide useful data;

- Dilution of high concentration samples rather than extending calibration ranges (two laboratories);

- Running low- and mid-level calibration standards daily in place of the three-point curve with daily verification and subsequent quantitation of samples according to the standard closest to their concentrations with dilution of high concentration samples if necessary;

- Doubling the temperature program rate of the GC to reduce analysis time;

- Computing the results for Youden pairs using the isotope dilution method to determine the accuracy of isotope dilution.

- Determining which of the Youden pairs have quantitative ions that contribute to each other and verifying that proper deconvolution of these pairs is performed using the 1624/1624 formulae;

- Increasing the allowable relative standard deviation from linerity for the volatile gases to 20% due to greater inherent variability for these compounds;

- Adding charcoal to the trap to increase trapping efficiency for highly volatile compounds;

- Using m/e 62, m/e 83 and m/e 166 for quantitation of 1,2-dichloroethane, tetrachloroethane and tetrachloroethene, respectively. These are based on the greater abundance of the first ion allowing increased sensitivity and improved accuracy when the latter ions are used; and

- Using a sample size of 25 mL to increase sensitivity for low-concentration compounds.

SECTION 7

EVALUATION OF SURROGATE COMPOUNDS

In order to examine the relationship between surrogate and spike recoveries, surrogate recoveries were correlated with the recoveries for each priority pollutant.

Table 16 presents the correlation matrices for the volatile organic compounds. Potential outliers were not discarded from the recovery data in performing the correlation analysis. The influence of outliers in the data were minimized by using Spearman's coefficient of rank correlations [9], which are correlations of the ranks of the variables. Approximately 350 data pairs were used to calculate each of the coefficients.

The correlation coefficient is a measure of the strength of the linear relationship between two variables. A correlation of one indicates that the two variables are perfectly linearly related and that one increases as the other increases. A correlation of minus one indicates that a perfect linear relationship exists, but that one variable decreases as the other increases. A correlation of zero indicates that there is no linear relationship at all between the two variables. The square of the correlation coefficient is interpretable as the fraction of the variability in one variable that can be explained or predicted in terms of the other.

Statistical significance is important because even if two variables have no true or repeatable relationship, a correlation coefficient computed from a finite sample would not be expected

TABLE 16. CORRELATION COEFFICIENTS OF SURROGATE RECOVERIES AND SPIKE RECOVERIES

COMPOUND	RETENTION TIME (MINUTES)	SURROGATE					
		1,2-DICHLORO-BENZENE-D4 (RT-ND)	1,4-DICHLORO-BUTANE-D8 (RT-ND)	2-BROMO-1-CHLOROPROPANE-D6 (RT-ND)	BROMOCHLORO-METHANE-D2 (RT=9.3)	FLUORO-BENZENE (RT=18.4)	4-BROMOFLUORO-BENZENE (RT=28.3)
CHLOROMETHANE	2.3	-0.224	0.118	-0.097	-0.100	-0.165	-0.249
BROMOMETHANE	3.1	-0.209	0.158	-0.098	-0.138	-0.166	-0.265
CHLOROETHANE	4.6	-0.188	0.156	-0.034	-0.108	-0.162	-0.263
METHYLENE CHLORIDE	6.4	-0.009	0.191	0.060	0.014	-0.024	-0.031
TRICHLOROFLUOROMETHANE	8.3	-0.097	0.030	-0.144	-0.024	-0.138	-0.151
1,1-DICHLOROETHENE	9.0	-0.164	-0.007	-0.130	0.072	-0.262	-0.199
1,1-DICHLOROETHANE	10.1	-0.285	0.087	-0.181	0.006	-0.247	-0.308
TRANS-1,2-DICHLOROETHENE	10.8	-0.207	0.100	-0.096	0.006	-0.177	-0.216
CHLOROFORM	11.4	-0.121	0.150	0.032	-0.062	-0.053	-0.121
1,2-DICHLOROETHANE	12.1	-0.153	0.163	0.032	0.002	-0.033	-0.156
1,1,1-TRICHLOROETHANE	13.4	-0.186	0.077	-0.075	-0.039	-0.163	-0.224
CARBON TETRACHLORIDE	13.7	-0.163	0.176	-0.112	-0.034	-0.141	-0.193
BROMODICHLOROMETHANE	14.3	-0.089	0.196	-0.046	0.004	-0.096	-0.151
1,2-DICHLOROPROPANE	15.7	0.144	0.111	0.250	0.087	0.178	0.057
TRANS-1,3-DICHLOROPROPENE	15.9	-0.108	0.279	0.206	-0.084	0.110	-0.096
TRICHLOROETHENE	16.5	-0.008	0.022	0.089	-0.009	0.008	0.021
BENZENE	17.0	-0.082	0.098	0.078	-0.098	-0.050	-0.165
DIBROMOCHLOROMETHANE	17.1	0.020	0.163	0.036	0.076	-0.025	-0.017
CIS-1,3-DICHLOROPROPENE	17.2	-0.133	0.153	-0.139	-0.146	-0.107	-0.095
1,1,2-TRICHLOROETHANE	17.2	0.057	0.120	0.107	-0.093	-0.005	-0.051
BROMOFORM	19.8	-0.011	0.189	-0.023	0.097	-0.013	-0.034
1,1,2,2-TETRACHLOROETHANE	22.1	0.119	0.142	0.095	0.210	0.095	0.170
TETRACHLOROETHENE	22.2	-0.012	0.147	-0.032	-0.016	-0.021	0.036
TOLUENE	23.5	-0.004	0.103	-0.062	-0.014	-0.017	0.044
CHLOROBENZENE	24.6	0.050	0.096	-0.053	0.017	0.021	0.059
ETHYL BENZENE	26.4	0.021	0.126	-0.019	0.006	-0.003	0.060
1,3-DICHLOROBENZENE	ND	0.119	0.075	0.025	-0.023	0.061	0.101
1,2-/1,4-DICHLOROBENZENE	ND	0.356	0.038	0.174	0.129	0.174	0.221

ND = NOT DETERMINED
RT = RETENTION TIME

to be exactly zero. For the data presented in the table, a correlation coefficient is statistically significant at the 0.01 level if the coefficient is greater than 0.14 (or less than -0.14). A significant correlation indicates a real relationship between the compound and the surrogate. There is less than one chance in 100 that a particular one of the significant correlations could have occurred by random chance if the variables did not have an actual relationship.

With the exception of the surrogate compound, 1,4-dichlorobutane-d_8, over one-half of the correlation coefficients are negative. Of the 76 positive correlation coefficients, only 23 of these (30%) are statistically significant at the 0.01 level. Figure 1 shows a typical set of data for a non-significant relationship.

The analysis of the surrogate recovery data from the interlaboratory study do not indicate strong relationships between the recoveries of the surrogates and the recoveries of the compounds of interest. For only one compound (1,2-dichlorobenzene/ 1,4-dichlorobenzene) was a surrogate identified that could explain greater than 10% of the variation in the recoveries of the compound.

These results do not imply that surrogate/compound relationships do not exist. As long as the recoveries of a compound remain in a state of statistical control, then the variations in recoveries are expected to be random. The variation of the test methods (coefficient of variations generally greater than 20%) make it difficult to observe surrogate relationships with a "narrow" range of recoveries. In order to establish and quantify surrogate relationships, it is necessary to purposely decrease and increase the compound recoveries. This, of course, was contrary to the objectives of this interlaboratory study. Further investigations of various statistical approaches for the evaluation

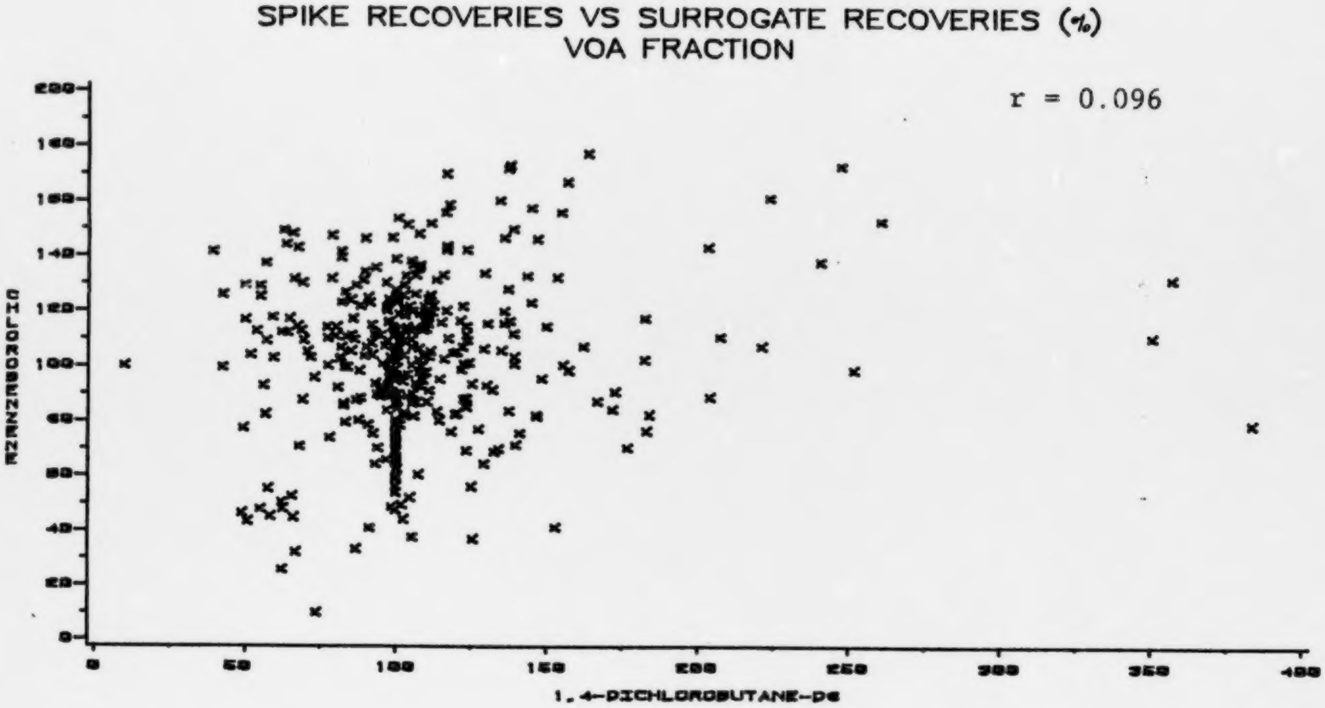
SPIKE RECOVERIES VS SURROGATE RECOVERIES (%)
VOA FRACTION
r = 0.096
CHLOROBENZENE
0
20
40
60
80
100
120
140
160
180
200
50
150
250
300
350
400
1,4-DICHLOROBUTANE-D8

FIGURE 1.

of surrogate compounds will be implemented and reported in a separate report at a later time.

For volatile organic compounds eluting up to 15.7 minutes, 4-bromofluorobenzene tends to have the highest correlation coefficient. For compounds eluting after 14.3 minutes, 1,4-dichlorobutane-d_8 generally has the highest correlation coefficients. Correlation coefficients for compounds eluting between 14.3 and 15.7 minutes are not significantly different for the two surrogate compounds, 4-bromofluorobenzene and 1,4-dichlorobutane-d_8.

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APPENDIX A

STUDY ON FALSE POSITIVES AND FALSE NEGATIVES

A small study was conducted on a very challenging sample to determine the extent of false positives and false negatives. An industrial effluent water was supplied to the participants in the study by Radian. The sample contained both priority and non-priority pollutants. Table 1 shows the number of false positives and number of false negatives for the hard-to-analyze sample using the following definitions:

1) A compound is considered present in the sample if one-half or more of the laboratories (seven or more) quantified the compound at greater than 1 μg/L. (For these compounds there is potential for false-negatives.)

2) A compound is considered not present in the sample if less than one-half of the laboratories reported the compound at greater than 1 μg/L. (For those compounds, there is potential for false-positives).

3) A reported value is only considered a false-positive if it was reported at greater than 1 μg/L.

Using these definitions, eight volatile organic compounds are present in the sample. For these compounds, there are a total of 24 false negatives (twenty percent of the possible results). There are also eight compounds which were reported by less than half of the laboratories (but reported at >1.0 μg/L by at least one laboratory). For these eight compounds, there were seventeen false positives (14 percent of the possible results).

TABLE A-1. FALSE POSITIVE AND FALSE NEGATIVE STUDY SAMPLE RESULTS FOR THE VOA FRACTION

	LABORATORY														
COMPOUND	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
BENZENE	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
CHLOROFORM	+	+	+	+	+	+	-	+	+	-	-	+	-	+	-
CIS-1,3-DICHLOROPROPENE	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
METHYLENE CHLORIDE	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+
TOLUENE	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
1,1-DICHLOROETHENE	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
2-CHLORETHYLVINYL ETHER	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-

TABLE A-2. STATISTICAL SUMMARY OF THE FALSE POSITIVE AND FALSE NEGATIVE STUDY FOR THE VOA FRACTION

COMPOUND	NO. OF VALUES DETECTED	NO. OF VALUES NOT DETECTED	QUALITATIVE PERFORMANCE*	
			FALSE POSITIVES	FALSE NEGATIVES
BENZENE	15	0		0
CHLOROFORM	10	5		5
CIS-1,3-DICHLOROPROPENE	1	14	1	
METHYLENE CHLORIDE	14	1		1
TOLUENE	15	0		0
1,1-DICHLOROETHENE	1	14	1	
2-CHLORETHYLVINYL ETHER	1	14	1	

* IF MORE THAN HALF OF THE LABORATORIES QUANTITATED THE COMPOUND AT >10 UG/L, THEN THE COMPOUND IS CONSIDERED PRESENT IN THE SAMPLE (POTENTIAL FOR FALSE NEGATIVES). OTHERWISE THE COMPOUND IS NOT CONSIDERED PRESENT IN THE SAMPLE (POTENTIAL FOR FALSE POSITIVES).

APPENDIX B

RESULTS OF GC/MS FEASIBILITY STUDY

To prove the feasibility of the study, Radian analyzed the Youden pair ampules spiked into water using the same procedures for the participating laboratories. Figure B-1 presents the total ion scan for the 1-2 Youden pair sample. Retention times for the sample and the masses used for both qualitative and quantitative analyses are given in Table B-1. As shown, the total ion scan provides well resolved peaks with little difficulty in interpretation with the exception of 2-chloroethylvinyl ether which decomposed in the solution and 1,2- and 1,4-dichlorobenzene which coelated 1.

FIGURE B-1. TOTAL ION SCAN OF THE 1-2 YOUDEN PAIR FEASIBILITY SAMPLE

```
   SAMPLE: METHOD 624,SPIKING COMPDS#1-2(5UL/5ML)TOTAL RUN TIME (MIN):
35
   FRN: 10875                                TOTAL NUMBER OF SCANS: 750
   LARGEST PEAK SCAN NO.: 283                LARGEST PEAK ABUND.: 148840
   LARGEST PEAK RET. TIME(MIN): 13.26         TOT. RUN ABUND.: 8.82122E+06
```

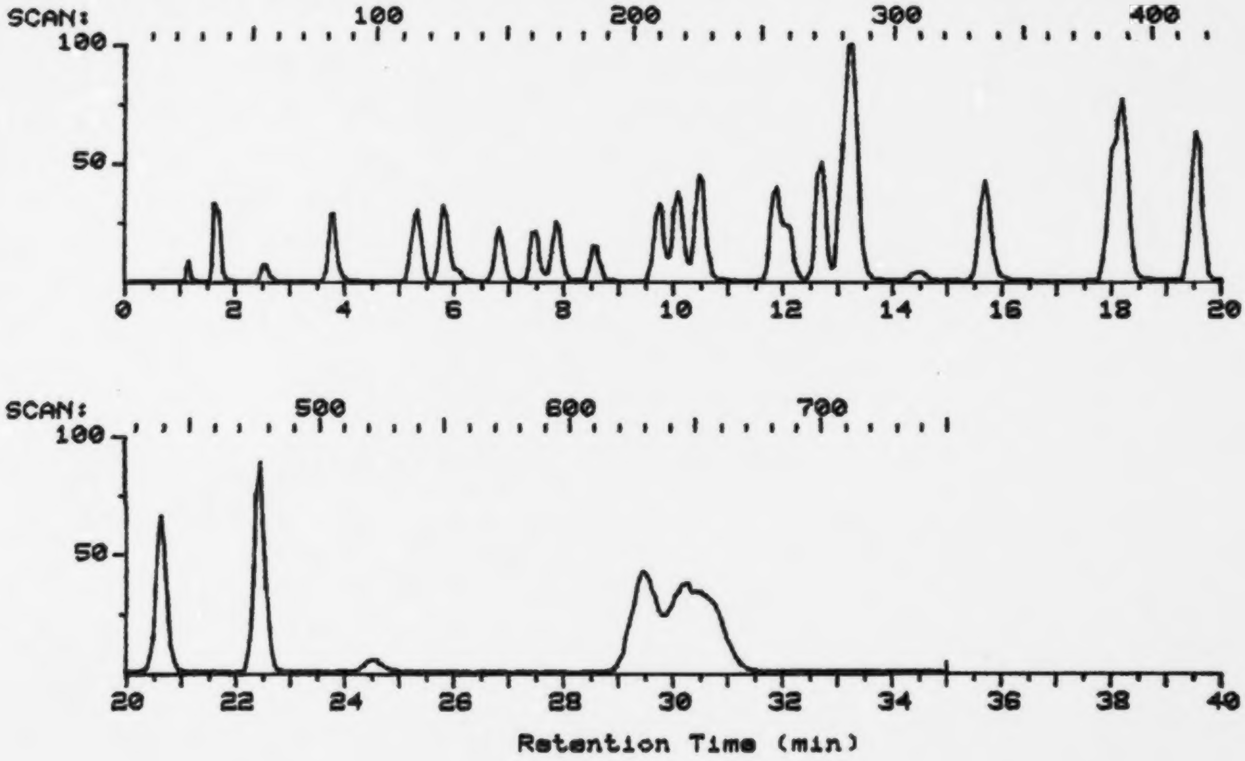

TABLE B-1. RETENTION TIMES AND MASSES FOR VOLATILE COMPOUNDS (1-2 YOUDEN PAIR FEASIBILITY SAMPLE)

Compound	Retention Time	m/e
Bromodichloromethane	10.5	127
Bromoform	15.7	173
Bromomethane	1.6	94
Chloroethane	2.5	64
2-Chloroethyl Vinyl Ether*	14.5	63
Chloromethane	1.2	50
Dibromochloromethane	13.1	127
1,1-Dichloroethene	5.8	96
1,1-Dichloroethane	6.8	63
1,2-Dichloroethane	8.5	98
1,2-Dichloropropane	11.9	63
cis-1,3-Dichloropropene	13.3	75
trans-1,3-Dichloropropene	12.2	75
Ethyl Benzene	22.5	106
Methylene Chloride	3.8	84
1,1,2,2-Tetrachloroethane	18.0	83
Tetrachloroethene	18.2	164
1,1,1-Trichloroethane	9.7	97
1,1,2-Trichloroethane	13.3	97
Trichloroethene	12.7	130
1,2-Dichlorobenzene**	30.3	146
1,3-Dichlorobenzene	29.4	146
1,4-Dichlorobenzene**	30.3	146
Trichlorofluoromethane	5.3	79
Benzene	13.2	78
Carbon Tetrachloride	10.1	117
Chlorobenzene	20.7	112
Chloroform	7.9	83
Trans-1,2-Dichloroethene	7.6	96
Toulene	19.5	92

*Decomposed in the solution mixture

**Compounds co-eluted from the GC column.

APPENDIX C

RAW DATA

(Corrected for blank values for each laboratory)

TABLE C-1

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR BENZENE ANALYSIS BY WATER TYPE
LOW YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	1	2	1	2	1	2	1	2
TRUE CONC:	10.8	12.0	10.8	12.0	10.8	12.0	10.8	12.0
LAB NUMBER								
1	10.7	1.9*	9.6	13.1	11.0	12.2	9.9	11.1
2	15.0*	16.7*	13.8*	15.9*	11.8	16.2	12.2*	17.2*
3	11.6	12.2	11.3	12.8	13.4	12.9	9.4	39.5*
4	11.8	10.7	7.2	15.9	14.8	12.3	17.9*	13.3
5	9.7	11.3	11.8	10.0	8.9	11.1	0.0*	0.0*
6	9.0	12.1	9.9	11.4	11.0	10.0	8.8	10.7
7	9.7*	7.6*	6.5*	11.9*	10.0*	11.0*	8.3*	9.5*
8	12.7	14.3	13.2	12.2	13.2	12.5	14.8	15.6
9	14.1	14.1	13.4	14.7	12.5	14.0	12.8	14.9
10	10.3	13.3	12.0	11.3	11.3	11.5	10.6	11.6
11	13.3	11.6	12.8	10.8	10.6	11.7	11.4	11.1
12	12.2	14.1	12.2	12.4	12.2	14.8	10.8	12.5
13	12.3	17.6	12.9	24.3*	19.7*	16.7	10.9	11.8
14	35.7*	13.3	36.4*	5.4*	14.8	15.3	10.5	13.1
15	5.1*	17.2	14.4	15.1	9.3	11.8	9.0	12.5

TABLE C-2

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR BENZENE ANALYSIS BY WATER TYPE
MEDIUM YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	3	4	3	4	3	4	3	4
TRUE CONC:	114.0	120.0	114.0	120.0	114.0	120.0	114.0	120.0
LAB NUMBER								
1	114.0	106.0	132.1	110.0	113.0	119.0	102.7	114.3
2	136.0*	144.7*	131.6*	169.3*	133.4	135.7	135.8*	153.9*
3	117.7	126.5	122.8	122.1	121.3	130.8	125.7	146.3
4	109.3	129.6	100.1	145.5	206.8*	158.1	120.8	190.8
5	105.1	96.8	96.1	101.8	102.1	114.0	76.8	93.8
6	107.3	89.3	94.7	96.8	92.8	113.3	98.1	77.5
7	76.8*	99.5*	88.3*	91.0*	88.7*	92.7*	103.0*	97.7*
8	123.9	117.9	107.7	140.9	148.3	122.6	144.8	135.2
9	136.0	146.0	139.0	146.0	128.0	132.0	144.0	149.0
10	108.3	106.4	92.7	110.3	91.4	102.9	106.3	99.7
11	127.1	103.4	124.9	127.1	97.4	100.2	74.3	97.2
12	147.0	141.0	90.0	144.0	127.0	146.0	104.0	147.0
13	112.4	*	313.4*	120.5	158.7	148.9	108.8	0.0*
14	207.8	125.0	158.9	91.8	134.3	143.7	122.3	113.7
15	31.0	153.1	155.7	106.2	83.3	102.9	118.3	96.9

TABLE C-3

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR BENZENE ANALYSIS BY WATER TYPE
HIGH YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	5	6	5	6	5	6	5	6
TRUE CONC:	480.0	432.0	480.0	432.0	480.0	432.0	480.0	432.0
LAB NUMBER								
1	446.0	409.0	529.0	370.0	443.0	382.0	428.7	410.3
2	640.5*	715.7*	671.5*	569.8*	714.2	569.4	745.5*	604.9*
3	412.5	361.9	395.5	380.7	398.2	381.0	388.8	362.1
4	511.7	430.4	444.0	523.0	524.5	280.5	465.8	603.9*
5	416.1	329.0	389.8	427.8	424.0	366.0	446.8	276.8
6	333.3	244.3	241.0	243.0	222.3	352.3	298.0	291.8
7	136.0*	186.0*	161.0*	165.0*	238.0*	188.0*	185.0*	181.0*
8	405.3	396.7	354.2	428.8	425.7	451.8	443.2	415.2
9	383.0	397.0	358.0	350.0	266.0	277.0	288.0	296.0
10	335.7	283.3	294.2	256.7	274.1	270.8	289.7	247.2
11	570.0	406.0	507.0	483.0	414.0	362.0	422.0	361.0
12	511.0	466.0	516.0	520.0	538.0	427.0	600.0	441.0
13	222.1	282.1	429.9	366.9	332.6	307.6	353.5	265.5
14	536.0	358.5	471.9	394.0	263.9	480.5	443.1	304.0
15	598.6	148.7	384.7	668.4	346.1	444.6	370.8	307.5

TABLE C-4

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
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ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR BROMODICHLOROMETHANE ANALYSIS BY WATER TYPE
LOW YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	1	2	1	2	1	2	1	2
TRUE CONC:	8.0	9.2	8.0	9.2	8.0	9.2	8.0	9.2
LAB NUMBER								
1	0.3	5.6	2.9	12.8	6.0	2.0	6.3	4.5
2	0.0*	12.1	0.0*	10.4	5.1	4.3	3.4	3.8
3	7.4	6.3	20.8	20.6	7.1	6.3	6.8	11.6
4	9.3	7.5	15.9	14.8	5.4	9.0	11.8	13.7
5	9.1	5.6	0.9	5.4	8.3	3.8	6.9	9.3
6	4.7	4.2	4.6	8.1	6.5	8.2	6.3	4.8
7	6.5	3.9	5.0	7.2	5.6	5.1	5.0	5.1
8	7.3	6.5	7.6	7.5	7.6	5.7	9.8*	7.6*
9	9.9	8.1	9.7	8.7	8.9	8.0	9.1	8.7
10	6.8	8.0	8.2	7.4	8.8	7.7	9.0	7.5
11	7.2	6.2	0.0*	4.3	7.3	6.6	8.3	6.0
12	4.4	6.5	20.0	17.0	7.8	6.1	6.5	3.9
13	9.8	11.2	11.3	18.7	15.2	9.2	8.0	7.2
14	10.4	8.2	0.0*	0.0*	8.8	8.0	7.3	7.0
15	19.9*	9.3	8.3	10.6	13.4	9.1	30.2*	3.5

TABLE C-5

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR BROMODICHLOROMETHANE ANALYSIS BY WATER TYPE
MEDIUM YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	3	4	3	4	3	4	3	4
TRUE CONC:	120.0	114.0	120.0	114.0	120.0	114.0	120.0	114.0
LAB NUMBER								
1	156.0	77.6	177.5	75.9	137.0	91.1	128.0	74.2
2	143.0	75.9	141.2	84.1	157.3	70.1	122.7	56.4
3	124.6	102.0	146.8	110.8	129.8	120.7	111.8	82.9
4	139.7	89.9	122.2	65.1	130.0	70.6	62.8	113.9
5	144.0	76.6	116.7	62.4	74.3	111.0	129.0	112.0
6	66.6*	63.0	108.0	75.8	112.6	64.3	0.0*	50.6
7	92.2*	111.0	104.0	92.3	105.0	96.4	119.0	92.4
8	132.4	93.9	151.2	79.2	145.4	71.4	151.1*	143.5*
9	144.0	112.0	143.0	120.0	127.0	122.0	151.0	125.0
10	140.8	102.1	124.4	124.9	129.4	105.4	137.7	105.1
11	117.6	97.8	96.0	90.5	112.8	98.4	83.2	99.2
12	166.0	132.0	97.6	133.0	137.0	131.0	108.0	151.0
13	137.4	*	380.3*	104.7	194.5	122.7	124.6	0.0*
14	146.3	146.3	142.3*	15.9*	153.8	131.3	135.7	102.1
15	134.7	129.6	189.6	105.5	120.6	143.6	94.3	125.4

TABLE C-6

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR BROMODICHLOROMETHANE ANALYSIS BY WATER TYPE
HIGH YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	5	6	5	6	5	6	5	6
TRUE CONC:	432.0	480.0	432.0	480.0	432.0	480.0	432.0	480.0
LAB NUMBER								
1	443.0	473.0	468.8	474.7	448.0	483.0	412.0	379.0
2	702.1	723.4	662.6	630.9	666.6	723.7	737.3*	648.4
3	415.2	451.5	421.5	493.4	404.0	508.5	382.6	495.1
4	365.9	472.1	369.2	538.5	271.9	319.8	262.7	477.2
5	485.0	333.0	380.7	361.7	256.0	522.0	473.0	358.0
6	459.0	443.0	422.0	529.0	384.0	409.0	331.0	543.0
7	279.0	361.0	330.0	370.0	476.0	402.0	345.0	367.0
8	717.3	535.6	536.5	601.4	414.3	577.7	581.1*	597.0*
9	403.0	601.0	502.0	485.0	390.0	443.0	378.0	548.0
10	528.3	516.2	575.1	497.3	530.2	519.9	482.3	627.7
11	424.0	463.0	688.2	794.2	399.0	430.0	402.0	431.0
12	459.0	519.0	428.0	650.0	454.0	475.0	531.0	448.0
13	264.4	386.3	509.7	478.2	382.0	475.2	379.1	361.3
14	453.2	417.6	352.8*	334.9*	260.2	510.2	376.7	329.3
15	532.1	389.1	408.9	593.3	555.6	559.7	439.9	739.5

TABLE C-7

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR BROMOFORM ANALYSIS BY WATER TYPE
LOW YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	1	2	1	2	1	2	1	2
TRUE CONC:	9.0	10.0	9.0	10.0	9.0	10.0	9.0	10.0
LAB NUMBER								
1	7.6	9.8	8.2	10.3	10.8	7.0	9.2	8.9
2	9.9	13.1	8.0	14.6	7.0	12.9	7.5	13.4
3	7.6	7.2	6.2	8.0	5.7	6.2	6.0	3.2
4	3.9*	6.6*	4.6*	3.4*	10.1	9.4	6.6	7.4
5	4.2	7.4	6.4	6.2	6.0	5.4	2.9	6.9
6	0.0*	2.8	0.0*	0.0*	3.6	0.0*	0.0*	2.9
7	5.1	3.7	3.4	3.8	2.3	1.9	2.3	3.9
8	5.9	8.1	5.9	9.3	9.6	8.1	7.9	7.3
9	9.5	11.5	7.5	19.7	9.0	9.7	8.5	12.2
10	8.5	14.1	8.7	9.7	13.1	11.4	9.2	14.5
11	8.1	9.1	5.2	6.0	8.4	8.3	8.8	8.9
12	11.0	10.8	14.7	12.2	9.5	11.2	7.3	12.4
13	11.1	10.8	11.0	24.3	9.1	8.5	6.2	4.9
14	11.5	13.5	48.3*	11.3	10.8	10.0	7.3	9.8
15	56.1*	54.3*	7.3	24.4	120.4*	15.4	67.8*	4.1

TABLE C-8

ENVIRONMENTAL MONITORING AND SUPPORT LAPORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR BROMOFORM ANALYSIS BY WATER TYPE
MEDIUM YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	3	4	3	4	3	4	3	4
TRUE CONC:	95.0	100.0	95.0	100.0	95.0	100.0	95.0	100.0
LAB NUMBER								
1	106.0	46.3	121.4	49.1	134.0	42.9	102.0	48.9
2	104.7	46.2	85.5	63.6	107.8	54.6	120.3	47.9
3	115.4	44.0	113.7	37.4	107.6	65.2	60.1	17.6
4	83.4*	39.0*	59.8*	27.2*	86.8	44.9	73.8	133.3
5	108.0	41.8	95.9	35.7	70.4	46.8	85.8	45.8
6	29.1*	14.0	72.6	35.1	62.6	23.9	87.2	14.1
7	77.6	116.0*	95.9	35.8	88.5	51.5	94.8	49.5
8	115.1	56.2	164.2	42.3	149.6	46.8	120.8	116.6
9	108.0	54.7	192.2	55.1	101.0	46.7	101.0	60.7
10	112.3	53.6	88.3	79.9	83.5	44.3	105.0	39.6
11	97.6	61.4	81.9	42.4	103.1	72.8	68.3	78.0
12	123.0	73.2	69.1	84.9	104.0	81.7	77.9	97.4
13	127.3	*	375.7*	50.1	134.2	51.6	94.5	27.2
14	91.8	75.8	218.9	60.3	111.5	84.7	112.0	47.1
15	121.9	39.0	136.0	89.5	125.6	75.2	65.6	218.0*

TABLE C-9

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR BROMOFORM ANALYSIS BY WATER TYPE
HIGH YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	5	6	5	6	5	6	5	6
TRUE CONC:	400.0	360.0	400.0	360.0	400.0	360.0	400.0	360.0
LAB NUMBER								
1	408.0	374.0	405.0	371.7	489.0	300.0	425.0	395.0
2	564.5	564.9	506.4	493.2	593.7	572.4	604.6	582.0
3	470.4	439.1	465.9	445.6	479.3	452.9	434.3	285.7
4	292.3*	364.3*	296.3*	299.4*	355.2	254.5	301.0	469.6
5	398.0	305.0	362.0	314.0	271.0	361.0	391.0	295.0
6	580.0	519.0	698.0	685.0	473.0	530.0	657.1	808.0*
7	532.0	530.0	604.0	481.0	1025.0*	605.0	584.0	494.0
8	1603.2*	495.9	750.1	583.8	487.0	508.5	683.2	463.2
9	374.0	459.0	818.2	384.2	307.0	334.0	341.0	445.0
10	380.6	373.9	453.2	307.8	304.1	298.8	403.3	290.9
11	434.0	361.0	443.2	467.2	411.0	348.0	405.0	319.0
12	407.0	348.0	415.0	565.0	411.0	338.0	408.0	357.0
13	350.0	424.2	726.0	443.5	466.8	437.8	270.1	341.6
14	448.9	365.9	416.2	345.0	280.8	405.2	368.5	299.5
15	498.4	664.7	455.8	722.6	797.6*	417.5	326.1	2317.1*

TABLE C-10

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR BROMOMETHANE ANALYSIS BY WATER TYPE
LOW YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	1	2	1	2	1	2	1	2
TRUE CONC:	10.1	9.1	10.1	9.1	10.1	9.1	10.1	9.1
LAB NUMBER								
1	3.7*	2.9*	3.6*	2.6*	3.9*	2.9*	3.5*	4.2*
2	10.4	8.8	9.0	7.6	9.0	10.5	6.5	8.5
3	6.6	6.2	6.2	5.8	6.0	6.1	5.8	13.4
4	4.0	2.9	3.8	4.1	3.3	6.4	5.1	8.0
5	4.9	7.4	3.5	4.1	4.4	2.5	9.9	0.0*
6	0.0*	34.5*	47.9*	37.9*	43.6*	14.3*	30.0*	30.1*
7	4.4	2.0	2.3	3.8	3.8	2.2	7.1	2.6
8	4.4	16.4*	4.3	3.0	8.8	10.1	17.3*	4.3
9	6.5	5.3	6.3	7.3	6.1	5.4	5.8	6.7
10	4.8	6.3	8.7	6.4	7.4	5.7	8.4	5.0
11	6.0	4.9	0.9	3.1	5.8	5.0	5.1	4.7
12	8.4	7.2	7.4	0.0*	8.2	7.1	5.6	8.9
13	7.5	21.9*	7.6	10.3	16.0*	6.4	7.5	0.0*
14	7.2	4.6	23.4*	4.9	6.0	5.0	2.7	4.8
15	21.3*	10.2	11.1*	8.3*	7.0	3.4	5.0	9.3

TABLE C-11

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR BROMOMETHANE ANALYSIS BY WATER TYPE
MEDIUM YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	3	4	3	4	3	4	3	4
TRUE CONC:	152.0	144.0	152.0	144.0	152.0	144.0	152.0	144.0
LAB NUMBER								
1	58.1*	42.5*	84.4*	47.5*	68.5*	38.8*	52.5*	44.1*
2	157.3	70.8	141.2	65.6	122.0	85.5	155.6	49.8
3	111.3	70.7	119.1	62.9	118.2	83.0	306.9*	282.0
4	64.6	84.8	77.7	64.0	164.6	131.9	87.7	94.7
5	104.0	51.5	61.9	49.2	56.3	86.6	81.6	67.6
6	426.0*	50.1	718.0*	456.0*	407.6*	501.0*	675.0*	355.0
7	67.7	81.2	70.0	65.8	72.9	55.0	95.8	60.9
8	157.0	60.5	83.7	63.9	89.4	189.0*	77.9	263.0
9	96.9	95.9	111.0	97.9	95.4	95.3	109.0	112.0
10	120.8	75.8	114.2	95.6	107.9	98.9	107.1	113.4
11	123.8	83.7	120.0	69.1	58.6	93.4	77.7	87.7
12	149.0	96.7	57.8	106.0	123.0	102.0	53.0	107.0
13	105.7	*	360.6*	84.0	133.0	68.8	130.9	72.3
14	120.4	55.2	145.4	60.3	116.2	77.4	111.8	44.9
15	152.2	76.7	167.1*	129.9*	62.4	133.3	208.5*	53.4

TABLE C-12

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR BROMOMETHANE ANALYSIS BY WATER TYPE
HIGH YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	5	6	5	6	5	6	5	6
TRUE CONC:	546.0	607.0	546.0	607.0	546.0	607.0	546.0	607.0
LAB NUMBER								
1	248.0*	277.0*	282.0*	270.0*	228.0*	217.0*	223.0*	276.0*
2	424.4	681.1	554.4	382.9	427.7	702.4	421.5	575.9
3	382.7	468.2	381.7	468.4	404.4	425.8	397.5	1991.8*
4	416.4	806.5	664.1	1021.0	386.7	395.9	661.6	640.8
5	486.0	296.0	284.0	287.0	243.0	483.0	456.0	300.0
6	2366.0*	375.0	3350.0*	2810.0*	2270.0*	1230.0*	272.9	3241.0*
7	211.0	326.0	272.0	290.0	331.0	334.0	335.0	314.0
8	322.8	1268.8*	300.2	774.6	741.2*	746.1	351.4	1087.1*
9	302.0	461.0	391.0	368.0	305.0	331.0	292.0	439.0
10	415.6	325.8	345.9	435.5	401.7	408.0	362.7	568.5
11	466.0	563.0	177.0	279.0	417.0	425.0	462.0	442.0
12	413.0	453.0	511.0	439.0	392.0	464.0	483.0	466.0
13	498.8	492.9	609.9	671.0	327.1	463.0	425.7	534.3
14	506.9	483.1	367.6	521.1	259.6	580.7	389.3	346.4
15	486.0	750.0	691.7*	689.0*	607.3*	260.5	633.9	263.8

TABLE C-13

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR CARBON TETRACHLORIDE ANALYSIS BY WATER TYPE
LOW YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	1	2	1	2	1	2	1	2
TRUE CONC:	9.0	10.0	9.0	10.0	9.0	10.0	9.0	10.0
LAB NUMBER								
1	7.5	9.3	8.1	8.6	8.4	9.7	7.4	8.9
2	12.3*	14.9*	12.5*	16.1*	8.2	14.0	10.3	11.9
3	8.2	9.0	7.5	9.1	8.0	9.1	3.5	8.2
4	8.0	9.4	7.8	9.4	2.1	13.7	6.4	8.9
5	9.5	8.9	4.6*	9.1*	7.4*	3.4*	7.7	9.9
6	6.1	9.7	6.1	8.9	8.2	8.7	6.0	6.5
7	4.9*	4.2*	3.3*	6.4*	5.6	5.7	4.3	5.8
8	6.5	8.8	9.3	9.7	7.5	8.4	12.3*	10.4*
9	5.6	10.9	10.4	13.2*	9.3	11.1	10.0	12.1
10	6.2	9.5	7.6	7.9	8.3	8.9	8.2	8.4
11	8.7	10.2	6.9	7.8	9.4	10.5	8.7	8.9
12	11.0	13.4*	10.8	8.6	11.3	12.7	9.6	14.0
13	8.1	1.5*	8.4	18.7*	14.8	10.8	7.1	7.8
14	10.9	10.2	35.0*	9.6	11.8	10.9	9.3	10.2
15	19.3*	12.6*	7.3	9.8	7.0	8.5	10.1	6.5

TABLE C-14

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR CARBON TETRACHLORIDE ANALYSIS BY WATER TYPE
MEDIUM YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	3	4	3	4	3	4	3	4
TRUE CONC:	95.0	100.0	95.0	100.0	95.0	100.0	95.0	100.0
LAB NUMBER								
1	109.0	62.8	107.3	67.6	106.0	67.9	90.7	61.8
2	137.9*	72.2*	150.9*	69.1*	117.2	61.5	96.3	60.6
3	97.7	58.4	107.0	52.9	105.4	90.8	153.6*	98.8
4	111.6	76.6	98.4	54.3	133.5	60.1	60.7	91.9
5	104.0	44.4	79.9*	33.5*	39.3*	67.1*	94.2	63.0
6	52.9*	53.0	84.7	63.7	89.7	55.1	80.0	35.5
7	63.8*	78.7*	66.5*	59.3*	71.9	66.4	83.4	71.8
8	115.7	73.8	134.9	84.9	124.7	70.2	151.4*	156.2*
9	112.0	90.0	121.0	94.6	92.2	107.0	117.0	100.0
10	107.5	81.5	86.1	108.2	95.1	87.9	106.4	65.8
11	101.4	86.9	113.4	67.7	110.1	96.8	74.3	89.2
12	122.0	86.6	86.6	102.0	103.0	85.3	95.2	84.9
13	97.0	*	288.5*	14.5	146.6	105.0	93.1	80.5
14	105.9	69.9	172.4	69.8	126.9	100.4	116.9	69.3
15	131.9*	98.4*	151.1	84.1	93.0	91.8	82.2	105.1

TABLE C-15

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR CARBON TETRACHLORIDE ANALYSIS BY WATER TYPE
HIGH YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	5	6	5	6	5	6	5	6
TRUE CONC:	400.0	360.0	400.0	360.0	400.0	360.0	400.0	360.0
LAB NUMBER								
1	397.0	333.0	366.0	321.0	391.0	332.0	372.0	339.0
2	706.5*	666.6*	878.6*	559.6*	597.9*	601.0	831.1*	513.3
3	443.3	388.6	431.5	431.1	450.5	428.4	406.7	894.9*
4	395.8	400.2	360.8	521.3	361.2	221.1	394.4	378.1
5	446.0	265.0	345.0*	189.0*	164.0*	338.0*	401.0	303.0
6	468.0	323.0	400.0	427.0	366.0	367.0	237.8	398.0
7	224.0*	238.0*	245.0*	255.0*	380.0	280.0	301.0	271.0
8	739.0*	473.1	561.9	577.6	451.5	467.8	689.3*	562.7*
9	376.0	421.0	496.0	353.0	351.0	305.0	341.0	399.0
10	498.9	382.2	555.4	377.9	482.9	400.2	460.8	480.8
11	435.0	402.0	379.0	382.0	427.0	353.0	419.0	315.0
12	398.0	372.0	477.0	413.0	378.0	350.0	505.0	401.0
13	236.4*	300.6	502.5	380.5	377.3	366.6	380.2	284.7
14	517.6	490.0	441.0	434.8	314.8	526.0	422.9	57.9*
15	522.5*	447.9*	367.6	554.3	428.7	344.5	313.3	506.9

TABLE C-16

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR CHLOROBENZENE ANALYSIS BY WATER TYPE
LOW YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	1	2	1	2	1	2	1	2
TRUE CONC:	13.5	15.0	13.5	15.0	13.5	15.0	13.5	15.0
LAB NUMBER								
1	16.1	20.3	20.4	16.9	16.6	25.9*	21.0	15.8
2	15.8	20.6	13.4	22.2	11.1	19.5	12.5	21.4
3	15.3	17.2	13.3	15.6	16.9	18.7	11.9	17.4
4	15.4	14.7	16.9	16.5	15.0	48.1*	12.6	15.6
5	15.2	14.6	17.4	16.8	14.2	17.1	19.1	13.1
6	13.5	14.6	11.6	13.6	16.4	15.5	11.0	13.4
7	18.7	11.2	10.6*	12.9*	10.8*	13.4*	8.7	16.0
8	15.0	17.8	15.8	13.1	19.7	16.7	18.8	18.4
9	17.4	16.6	16.0	25.7	15.0	15.6	14.3	17.0
10	10.6	18.8	15.2*	13.3*	16.2	17.8	12.0	16.1
11	15.4	15.2	14.3	13.5	14.3	19.1	16.8	16.3
12	14.0	16.3	17.0	14.4	14.6	17.4	12.8	13.4
13	16.9	19.9	18.3	38.6*	22.9	17.5	14.9	21.6
14	17.7	16.6	53.0*	15.0	17.7	20.4	13.5	16.4
15	28.3*	31.4*	14.8	25.9	20.2	20.9	20.7	11.3

TABLE C-17

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR CHLOROBENZENE ANALYSIS BY WATER TYPE
MEDIUM YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	3	4	3	4	3	4	3	4
TRUE CONC:	142.0	150.0	142.0	150.0	142.0	150.0	142.0	150.0
LAB NUMBER								
1	222.9	199.9	116.8	188.0	164.0	233.0	170.0	182.0
2	161.2	193.8	131.4	212.0	187.0	171.5	175.7	220.7
3	156.0	182.2	161.0	152.8	188.3	199.0	193.5	119.0
4	160.1	201.0	68.8	137.8	207.5	14.8*	36.1	155.2
5	146.0	133.0	138.0	168.0	155.4	160.0	141.0	143.0
6	137.0	128.0	111.0	122.0	147.2	160.0	120.0	73.9
7	83.4	118.0	98.0*	89.0*	92.4*	108.0*	90.9	99.7
8	155.1	157.8	123.0	163.2	212.0	153.6	174.5	177.8
9	171.0	170.0	227.0	177.0	164.0	143.0	172.0	178.0
10	97.3	103.5	91.1*	124.9*	100.0	113.0	116.3	90.3
11	151.7	139.7	143.3	150.9	124.2	131.9	107.6	127.0
12	188.0	197.0	127.0	167.0	149.0	174.0	162.0	250.0
13	132.5	*	579.4*	146.1	203.4	155.9	134.3	195.1
14	176.0	159.0	207.0	154.4	164.8	166.5	136.3	129.6
15	211.5*	147.4*	161.7	172.6	151.8	154.7	113.6	165.7

TABLE C-18

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR CHLOROBENZENE ANALYSIS BY WATER TYPE
HIGH YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	5	6	5	6	5	6	5	6
TRUE CONC:	600.0	540.0	600.0	540.0	600.0	540.0	600.0	540.0
LAB NUMBER								
1	690.9	586.9	451.0	765.0	604.0	789.0	746.0	657.0
2	850.8	931.8*	788.8	745.4	908.8	822.9	949.8	869.3
3	716.6	556.6	572.5	569.3	765.2	621.3	494.6	431.4
4	263.4	616.1	330.2	556.2	498.0	683.7	220.2	444.0
5	655.0	502.0	564.0	635.0	660.0	536.0	656.0	417.0
6	536.0	398.0	384.0	377.0	394.0	522.0	311.0	451.0
7	284.0	385.0	321.0*	371.0*	567.0*	389.0*	335.0	373.0
8	600.3	513.4	461.0	565.1	246.6	632.1	636.0	542.5
9	547.0	336.0	545.0	499.0	191.0	220.0	198.0	202.0
10	287.7	257.7	314.5*	243.5*	259.2	271.1	276.8	240.9
11	717.0	538.0	640.0	797.0	567.0	499.0	620.0	500.0
12	457.0	596.0	492.0	743.0	613.0	488.0	642.0	453.0
13	420.2	468.9	1061.1*	771.6	472.3	439.7	791.4	442.5
14	676.6	576.5	589.0	477.6	334.3	662.8	515.6	605.6
15	729.4*	679.2*	425.9	697.9	600.1	529.2	417.5	553.0

TABLE C-19

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR CHLOROETHANE ANALYSIS BY WATER TYPE
LOW YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	1	2	1	2	1	2	1	2
TRUE CONC:	8.1	7.3	8.1	7.3	8.1	7.3	8.1	7.3
LAB NUMBER								
1	5.6*	5.0*	6.7	3.8	6.5	3.4	6.0	7.7
2	19.1	12.2	13.3	6.9	10.4	22.9	10.7	16.0
3	6.2	8.8	11.8	3.6	13.6	6.8	8.3	20.8
4	11.3	8.0	8.4	7.1	5.9	15.5	9.2	12.7
5	9.5	5.7	10.0	6.9	6.7*	2.5*	9.3	7.0
6	5.9	8.7	10.1	6.9	5.9	6.8	6.2	7.3
7	6.1	3.6	3.9	6.3	6.1	4.4	5.2	4.4
8	6.2	17.9	6.8	4.7	10.0	11.7	19.8*	6.2
9	14.1	8.0	13.6	14.0	16.0	14.0	8.5	13.6
10	6.6	7.8	9.9	8.4	9.2	7.6	9.4	6.0
11	7.8	5.0	0.0*	0.0*	6.1	0.0*	0.0*	4.7
12	10.6	8.7	9.6	0.0*	14.5	11.9	11.1	13.7
13	10.6	16.5	11.6	11.1	14.1	11.3	10.7	7.1
14	10.3	7.1	39.6*	7.5	11.8	8.5	6.9	7.9
15	23.7	11.0	13.5	10.5	8.0	11.9	5.6	11.5

TABLE C-20

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR CHLOROETHANE ANALYSIS BY WATER TYPE
MEDIUM YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	3	4	3	4	3	4	3	4
TRUE CONC:	122.0	116.0	122.0	116.0	122.0	116.0	122.0	116.0
LAB NUMBER								
1	76.1*	60.6*	116.7	72.2	107.0	47.4	81.0	57.6
2	216.6	90.4	231.7	78.2	163.5	115.0	201.1	74.1
3	152.9	87.7	130.6	152.2	123.1	119.9	335.3	370.2*
4	21.4	103.0	120.3	78.9	288.5*	121.3	257.1	122.3
5	106.0	71.8	91.4	64.1	78.6*	71.9*	118.0	73.4
6	99.8	80.4	171.0	94.3	107.7	90.7	135.0	64.7
7	91.1	91.4	95.8	80.7	93.2	74.1	118.0	80.0
8	173.0	66.9	104.2	83.1	110.0	189.5	102.9	202.0*
9	131.0	120.0	127.0	119.0	115.0	107.0	132.0	118.0
10	152.6	97.6	144.1	127.1	143.2	118.9	134.1	128.0
11	186.6	98.1	165.6	86.2	137.4	113.4	110.2	103.1
12	222.0	144.0	121.0	199.0	177.0	158.0	124.0	132.0
13	145.7	*	361.5*	97.4	180.9	122.8	168.9	84.6
14	179.8	72.4	208.7	81.3	171.1	134.1	150.9	79.0
15	169.5	87.9	199.0	160.1	141.3	145.3	237.5	52.7

TABLE C-21

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR CHLOROETHANE ANALYSIS BY WATER TYPE
HIGH YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	5	6	5	6	5	6	5	6
TRUE CONC:	447.0	488.0	447.0	488.0	447.0	488.0	447.0	488.0
LAB NUMBER								
1	301.0*	434.0*	378.0	359.0	353.0	284.0	346.0	369.0
2	561.5	849.3	857.6	502.3	557.6	907.1	584.0	762.7
3	501.6	497.7	311.7	1504.9*	211.2	676.1	419.8	2560.0*
4	554.7	561.0	508.5	516.2	584.2	416.8	946.3	843.4
5	408.0	428.0	391.0	387.0	282.0*	393.0*	409.0	388.0
6	545.0	584.0	723.0	630.0	434.6	528.6	593.9	664.0
7	267.0	350.0	327.0	384.0	414.0	431.0	414.0	394.0
8	350.4	1361.2*	364.2	971.5	770.6	831.3	436.8	1112.6
9	364.0	382.0	420.0	417.0	340.0	382.0	337.0	401.0
10	562.4	451.1	482.8	574.5	531.3	562.5	439.7	624.6
11	693.0	562.0	223.0	328.0	431.0	435.0	456.0	555.0
12	594.0	769.0	834.0	666.0	653.0	686.0	752.0	988.0
13	643.4	646.9	588.5	772.8	468.1	608.9	490.4	691.4
14	666.6	610.4	474.9	745.8	309.6	784.3	492.8	448.5
15	601.6	747.1	733.6	737.0	609.5	767.5	785.7	271.6

TABLE C-22

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR CHLOROFORM ANALYSIS BY WATER TYPE
LOW YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	1	2	1	2	1	2	1	2
TRUE CONC:	5.0	4.5	5.0	4.5	5.0	4.5	5.0	4.5
LAB NUMBER								
1	3.9	3.8	0.0*	1.7	5.3	4.3	4.0	3.7
2	6.6*	7.5*	8.6	7.3	4.6	6.3	5.1	5.9
3	5.4	4.7	43.6*	41.9*	5.3	5.1	7.3*	13.8*
4	6.6	5.5	31.4	45.0*	4.9	9.9*	12.0*	13.1*
5	4.5	4.0	0.0*	10.6	3.6	1.2*	0.0*	0.0*
6	4.2	5.6	5.3	5.8	5.0	4.2	1.9	2.5
7	4.1	2.4	0.0*	10.4	0.0*	0.0*	3.7	3.2
8	4.9	4.6	5.4	3.9	4.9	4.2	7.8	6.0
9	5.7	5.0	5.4	5.0	5.0	4.7	5.2	5.3
10	4.7	4.3	3.1	0.9	3.4	3.7	4.9	2.9
11	5.3	4.5	0.0*	3.0	5.1	4.6	7.6	5.0
12	3.7	4.5	19.7	26.7	4.3	4.5	5.8	4.0
13	6.1	8.9*	13.1	19.2	6.5	5.9	5.1	5.2
14	4.4	4.5	0.0*	0.0*	7.3	5.3	4.7	6.8
15	8.0	3.7	0.0*	0.0*	0.0*	0.0*	0.0*	0.0*

TABLE C-23

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR CHLOROFORM ANALYSIS BY WATER TYPE
MEDIUM YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	3	4	3	4	3	4	3	4
TRUE CONC:	75.0	71.0	75.0	71.0	75.0	71.0	75.0	71.0
LAB NUMBER								
1	68.6	47.1	75.6	38.5	70.7	56.4	59.3	49.5
2	98.8*	60.5*	112.6	69.6	85.0	54.9	70.3	46.9
3	75.7	53.2	117.4*	76.1*	78.4	68.6	124.2*	132.4*
4	59.2	59.2	92.9	82.4	114.3	50.0	68.2	65.8
5	72.2	40.1	58.3	5.7	39.7	55.3	46.4*	28.0*
6	63.6	56.0	74.4	59.9	68.1	57.3	69.6	33.1
7	50.5	63.5	55.1	54.8	58.0	50.4	72.0	58.2
8	75.3	54.8	65.6	62.2	86.0	54.8	83.8	90.9
9	80.4	88.3	78.1	88.8	69.4	75.4	85.3	88.3
10	61.0	54.4	50.7	58.2	54.9	54.0	59.7	57.3
11	79.0	63.2	54.5	49.9	74.5	65.4	57.0	65.0
12	94.4	65.1	75.4	99.4	79.5	65.2	76.5	60.0
13	77.0	*	268.5*	68.6	108.5	66.2	76.7	64.0
14	81.7	96.2	92.3	15.0	92.9	61.8	87.4	40.2
15	68.3	58.9	0.0*	0.0*	36.0*	33.0*	28.5*	0.0*

TABLE C-24

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR CHLOROFORM ANALYSIS BY WATER TYPE
HIGH YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	5	6	5	6	5	6	5	6
TRUE CONC:	270.0	300.0	270.0	300.0	270.0	300.0	270.0	300.0
LAB NUMBER								
1	263.9	245.9	259.9	227.5	246.0	260.0	222.7	258.6
2	409.5*	446.1*	464.2	410.3	362.7	410.3	466.9*	366.7
3	264.8	300.2	295.1*	361.5*	273.3	326.5	258.9*	607.3*
4	240.5	268.6	260.2	376.0	182.5	265.3	245.1	296.2
5	272.0	221.0	222.3	165.3	142.7	268.7	245.6*	206.6*
6	289.0	263.0	260.0	347.0	240.8	277.8	197.2	302.6
7	148.0*	220.0	194.0	204.0	248.0	248.0	231.0	224.0
8	254.3	280.9	225.0	320.5	225.0	319.8	306.6	346.0
9	235.0	354.0	279.0	291.0	225.0	247.0	222.0	326.0
10	218.4	203.6	214.5	192.7	200.2	212.6	195.1	246.4
11	301.0	375.0	592.3*	702.3*	266.0	283.0	295.0	309.0
12	245.0	325.0	331.0	300.0	260.0	289.0	311.0	331.0
13	230.3	45.1*	86.2	70.2	48.8	346.3	324.8	306.0
14	688.4*	354.6	257.9	332.5	208.9	382.1	285.1	265.5
15	292.6	223.5	197.8*	253.8*	216.3*	259.4*	155.2*	87.4*

TABLE C-25

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR CHLOROMETHANE ANALYSIS BY WATER TYPE
LOW YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	1	2	1	2	1	2	1	2
TRUE CONC:	7.8	7.0	7.8	7.0	7.8	7.0	7.8	7.0
LAB NUMBER								
1	2.9	3.3	4.4	2.2	2.5	3.0	1.8	2.9
2	14.4	10.4	18.6*	10.2	12.4	12.9	9.6	10.0
3	7.7	6.8	6.6	6.6	7.2	6.9	9.1	24.5*
4	8.8	6.5	8.0	6.4	5.5	12.7	10.2	3.2
5	4.7	5.3	6.3	4.7	4.6	1.3	5.3	4.9
6	0.0*	0.0*	0.0*	0.0*	0.0*	0.0*	0.0*	0.0*
7	6.2	3.9	4.2	6.6	8.0	4.2	5.3	3.8
8	5.6	27.0	6.3	3.9	10.8	14.2	26.2*	5.0
9	0.0*	32.6	0.0*	15.5	26.1*	37.1*	0.0*	43.5*
10	3.6	7.3	*	6.6	5.2	2.9	*	5.0
11	0.0*	8.1	0.0*	0.0*	8.4	9.3	8.5	7.2
12	6.4	0.0*	7.4	1.0	3.7	0.0*	9.2	10.1
13	9.4	0.0*	7.5	15.6	13.4	10.6	14.4	4.0
14	11.3	9.1	51.2*	9.1*	0.0*	9.6	0.0*	9.3
15	57.1*	26.5*	35.6*	20.4*	25.7*	25.9*	12.9	32.4*

TABLE C-26

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR CHLOROMETHANE ANALYSIS BY WATER TYPE
MEDIUM YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	3	4	3	4	3	4	3	4
TRUE CONC:	117.0	111.0	117.0	111.0	117.0	111.0	117.0	111.0
LAB NUMBER								
1	81.9	72.7	62.7	72.4	55.2	56.0	69.1	35.1
2	217.8	93.5	270.2	93.6	179.0	104.1	230.2	76.2
3	132.2	90.0	135.8	78.0	126.0	94.3	511.0*	669.2*
4	109.4	73.5	135.3	73.1	292.5	115.4	85.4	136.8
5	92.6	59.2	69.2	60.7	105.9	65.8	84.3	60.7
6	0.0*	0.0*	0.0*	0.0*	0.0*	0.0*	0.0*	0.0*
7	98.4	86.9	101.0	89.7	110.0	65.8	117.0	60.0
8	218.4	60.7	99.0	77.7	122.6	306.0*	85.6	352.4*
9	44.2	376.0*	111.0	94.3	296.0	44.8	78.6	70.0
10	23.9	87.8	121.0	1.3*	120.2	78.1	117.9	1.0
11	183.6	143.9*	171.6	85.1	208.3	126.4	110.2	139.2
12	113.0	81.2	113.0	105.0	114.0	96.9	139.0	78.1
13	134.1	*	301.0	73.8	164.7	117.8	201.8	0.0*
14	251.0	97.8	281.8*	99.1*	205.8	0.0*	201.1	8.6
15	358.7*	125.2*	343.3*	423.8*	251.7*	422.4*	717.4*	138.6

TABLE C-27

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR CHLOROMETHANE ANALYSIS BY WATER TYPE
HIGH YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	5	6	5	6	5	6	5	6
TRUE CONC:	422.0	469.0	422.0	469.0	422.0	469.0	422.0	469.0
LAB NUMBER								
1	234.0	235.0	260.0	301.0	184.0	302.0	256.0	204.0
2	515.2	917.3	1022.8*	559.7	669.5	859.2	605.1	816.0
3	498.0	526.4	419.0	496.8	492.1	496.6	558.3	2256.7*
4	564.2	590.4	488.8	633.3	697.8	498.2	985.0	1186.5
5	361.0	327.0	294.0	400.0	377.0	364.0	337.0	345.0
6	0.0*	0.0*	0.0*	0.0*	0.0*	0.0*	0.0*	0.0*
7	189.0	266.0	279.0	267.0	289.0	344.0	294.0	222.0
8	314.8	1794.1*	351.4	903.9	1189.3	1028.2	403.3	1515.9
9	184.0	53.7	92.4	174.0	736.0	163.0	195.0	56.6
10	500.5	302.4	4.2	506.4	847.4	434.0	408.1	37.5
11	697.0	922.0	77.0	203.0	462.0	662.0	741.0	557.0
12	296.0	469.0	509.0	368.0	389.0	388.0	509.0	665.0
13	7.5	668.4	552.0	653.5	463.0	547.1	239.4	777.4
14	809.4	772.0	570.2*	1010.6*	334.6	134.5	621.0	66.9
15	965.9*	1913.1*	1727.9*	1511.5*	1802.7*	2087.2*	2071.7*	633.8

TABLE C-28

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR CIS-1,3-DICHLOROPROPENE ANALYSIS BY WATER TYPE
LOW YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	1	2	1	2	1	2	1	2
TRUE CONC:	8.0	8.9	8.0	8.9	8.0	8.9	8.0	8.9
LAB NUMBER								
1	6.4	9.6	8.5	10.0	9.9	8.7	9.2	9.4
2	10.5	15.1	6.1	15.2	8.9	14.4	9.5	14.5
3	19.1*	17.8*	17.6*	19.1*	16.4*	16.9*	13.7*	33.4*
4	12.1	7.1	5.2	8.2	10.9	10.3	11.7	9.3
5	10.8	9.1	7.7	9.2	11.1	2.8	9.6	10.9
6	0.0*	6.4*	5.2	0.0*	6.6	4.5	5.3*	7.2*
7	5.5*	4.1*	3.3*	6.5*	4.9*	5.7*	4.2*	5.7*
8	8.2	11.1	8.9	9.0	11.2	9.7	10.6	10.3
9	12.0	14.5	11.8	12.5	11.9	13.0	11.6	15.9
10	4.3*	6.4*	5.5*	4.9*	6.3*	5.3*	5.9	5.1
11	7.2	8.6	7.1	6.9	7.7	8.5	7.7	7.8
12	8.3	8.5	9.3	9.2	8.2	9.6	11.2	8.5
13	8.7	10.3	10.8	19.9	10.3	9.1	6.3	7.7
14	11.4	6.7	31.1*	6.9	9.2	12.8	6.7	10.8
15	32.9*	24.7*	12.8	14.8	40.4*	18.2	10.6	10.4

TABLE C-29

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR CIS-1,3-DICHLOROPROPENE ANALYSIS BY WATER TYPE
MEDIUM YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	3	4	3	4	3	4	3	4
TRUE CONC:	85.0	89.0	85.0	89.0	85.0	89.0	85.0	89.0
LAB NUMBER								
1	128.0	113.0	146.5	108.0	126.0	134.0	106.0	125.0
2	145.8	138.7	138.3	158.6	135.0	145.9	134.4	146.6
3	217.6*	227.3*	212.8*	238.7*	207.4*	239.2*	173.4*	299.6*
4	101.3	120.1	94.7	107.1	168.6	110.0	104.5	136.7
5	130.0	96.2	105.0	74.3	40.8	137.0	113.0	128.0
6	79.5*	39.3*	74.2	79.5	54.5	81.1	70.2*	58.8*
7	62.5*	85.6*	70.3*	86.5*	72.3*	84.9*	80.3*	81.9*
8	120.7	156.7	126.5	124.1	149.8	126.5	126.2	131.8
9	121.0	142.0	116.0	134.0	116.0	114.0	123.0	151.0
10	85.6*	83.3*	70.4*	95.7*	64.6*	93.2*	84.9	97.7
11	90.7	100.0	83.6	94.0	92.6	97.3	64.1	93.0
12	93.5	91.2	80.8	95.3	76.9	94.6	106.0	99.6
13	91.0	*	440.5*	128.7	110.0	120.9	79.8	89.9
14	112.7	95.8	152.8	126.2	134.4	110.8	121.1	87.8
15	151.2*	152.3*	131.4	133.9	117.2	133.7	135.6	111.6

TABLE C-30

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR CIS-1,3-DICHLOROPROPENE ANALYSIS BY WATER TYPE
HIGH YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	5	6	5	6	5	6	5	6
TRUE CONC:	357.0	321.0	357.0	321.0	357.0	321.0	357.0	321.0
LAB NUMBER								
1	449.0	366.0	444.0	352.0	464.0	364.0	444.0	376.0
2	637.4	911.9*	1067.4*	550.6	687.5	759.0*	708.4	743.0*
3	830.2*	747.2*	784.8*	809.3*	802.6*	805.7*	884.2*	511.3*
4	414.3	364.0	59.2	363.5	408.5	200.9	446.4	404.9
5	495.0	291.0	424.0	307.0	191.0	437.0	527.0	324.0
6	379.0*	131.0*	310.0	319.0	314.0	233.0	262.4*	286.0*
7	150.0*	188.0*	184.0*	179.0*	238.0*	180.0*	277.0*	175.0*
8	787.1	435.3	510.6	470.8	467.9	469.6	518.1	436.6
9	320.0	448.0	391.0	334.0	323.0	338.0	324.0	393.0
10	163.0*	149.4*	179.1*	120.8*	174.2*	114.8*	155.6	183.1
11	385.0	344.0	388.0	358.0	375.0	326.0	368.0	301.0
12	326.0	283.0	327.0	329.0	328.0	261.0	520.0	270.0
13	238.5	260.6	673.3	304.4	13.0	278.9	342.6	223.8
14	352.5	286.4	294.1	271.0	263.5	324.3	340.6	221.1
15	597.4*	591.1*	437.6	430.5	515.1	463.5	493.2	428.8

TABLE C-31

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR DIBROMOCHLOROMETHANE ANALYSIS BY WATER TYPE
LOW YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	1	2	1	2	1	2	1	2
TRUE CONC:	8.1	9.0	8.1	9.0	8.1	9.0	8.1	9.0
LAB NUMBER								
1	7.5	9.1	5.8	10.4	9.5	8.3	8.5	8.5
2	7.8	12.2	6.7	12.7	7.3	11.4	6.9	12.5
3	7.7	8.1	10.0	11.8	6.8	7.6	7.2	9.8
4	7.5	8.1	7.8	8.4	8.7	10.3	13.5*	11.0
5	9.7	7.8	5.7	8.0	8.5	5.4	7.8	9.9
6	4.1*	6.6*	5.7	7.5	7.8	7.3	5.4	7.6
7	6.2	4.2	4.6	5.6	3.9*	3.8	3.7*	5.2
8	5.6	8.2	6.0	8.2	9.2	7.8	8.3	0.9*
9	9.4	9.6	9.6	12.4	8.5	9.7	8.6	10.4
10	6.8	9.9	9.4	7.9	8.6	8.7	7.2	9.5
11	7.6	8.9	1.0	6.6	8.3	8.7	8.7	8.3
12	9.8	10.5	14.2	13.5	9.9	11.1	8.2	9.4
13	9.6	11.2	11.0	23.3*	11.3	8.9	6.3*	6.6*
14	11.6	12.0	11.7	0.0*	9.4	8.8	7.4	9.5
15	5.6	20.2*	8.4	14.8	38.7*	12.2	16.7*	8.9

TABLE C-32

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR DIBROMOCHLOROMETHANE ANALYSIS BY WATER TYPE
MEDIUM YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	3	4	3	4	3	4	3	4
TRUE CONC:	86.0	90.0	86.0	90.0	86.0	90.0	86.0	90.0
LAB NUMBER								
1	111.0	67.2	117.7	72.1	117.0	72.2	99.7	74.0
2	97.3	71.6	81.9	84.7	107.7	70.9	108.4	74.3
3	99.2	69.9	112.5	63.4	108.1	95.4	72.3	42.5
4	81.0	69.6	83.4	38.1	144.7	68.8	93.7	142.3
5	113.0	57.2	87.2	44.9	61.3	78.0	93.9	78.1
6	46.2*	45.0*	81.2	62.9	70.8	56.4	108.0	42.0
7	69.1	97.0	83.2	58.4	77.4	66.5	85.9	61.7
8	97.0	83.5	117.1	64.8	128.7	66.0	112.8	108.8
9	99.4	68.4	115.0	74.6	95.1	65.1	110.0	78.3
10	94.8	63.6	76.1	86.7	76.1	61.0	92.1	55.0
11	95.6	80.5	77.2	67.3	100.5	84.7	71.0	89.3
12	118.0	88.2	70.2	87.8	78.3	91.5	85.9	105.0
13	102.8	*	318.6*	62.3	123.2	73.7	82.8*	0.0*
14	101.3	97.6	132.6	59.4	104.1	92.5	103.4	67.7
15	65.5	104.5	159.1	81.5	106.2	88.2	140.3	128.4

TABLE C-33

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR DIBROMOCHLOROMETHANE ANALYSIS BY WATER TYPE
HIGH YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	5	6	5	6	5	6	5	6
TRUE CONC:	360.0	324.0	360.0	324.0	360.0	324.0	360.0	324.0
LAB NUMBER								
1	420.0	349.0	389.6	357.7	435.0	329.0	397.0	379.0
2	486.7	608.3*	563.7	423.3	541.9	573.1*	527.2	574.7
3	406.3	338.0	385.8	371.0	405.1	368.0	377.7	228.1
4	361.9	329.6	345.2	327.2	374.1	218.0	469.9	524.6
5	440.0	285.0	347.6	284.6	254.0	413.0	459.0	279.0
6	414.0*	234.0*	377.0	350.0	359.0	289.0	336.2	332.0
7	295.0	319.0	349.0	318.0	502.0	342.0	332.0	300.0
8	862.4*	362.8	487.6	441.4	385.9	400.6	508.0	386.7
9	297.0	375.0	410.0	296.0	276.0	273.0	288.0	322.0
10	329.1	291.2	375.3	253.1	276.1	263.4	317.0	257.3
11	412.0	379.0	641.3	668.3	411.0	357.0	417.0	342.0
12	394.0	341.0	370.0	472.0	404.0	329.0	376.0	323.0
13	218.7	256.8	469.7	312.7	293.5	274.5	273.3*	222.9*
14	356.2	275.6	271.1	223.2	217.7	320.9	303.6	294.4
15	707.5*	408.8	396.5	722.8	537.4	397.5	442.9	742.5*

TABLE C-34

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR ETHYL BENZENE ANALYSIS BY WATER TYPE
LOW YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	1	2	1	2	1	2	1	2
TRUE CONC:	15.0	17.0	15.0	17.0	15.0	17.0	15.0	17.0
LAB NUMBER								
1	16.3	22.2	22.6	18.5	18.7	26.3	23.1	17.0
2	15.9	25.0	14.3	27.0	13.9	23.3	15.2	25.5
3	18.1	17.4	15.4	17.9	19.3	19.1	14.8	14.5
4	17.8	21.6	17.0	20.3	15.5	24.2	30.1	17.9
5	15.6	16.4	20.2	15.7	14.7	18.9	24.9	280.6*
6	13.5	17.4	12.7*	15.6*	18.7	15.2	11.4*	13.9*
7	21.2	11.2	11.6*	12.1*	11.4*	14.2*	8.7*	17.7*
8	15.1	19.4	17.0	15.1	21.0	19.3	21.0	18.9
9	19.5	20.6	18.9	25.6	18.1	18.5	18.4	19.8
10	12.5	23.2	17.9	16.5	20.1	22.0	15.3	19.8
11	17.2	17.5	15.8	15.1	16.5	22.0	19.3	18.7
12	16.2	19.6	18.9	16.4	16.9	20.0	14.3	15.9
13	19.7	25.8	19.4*	39.0*	26.9	19.7	21.1	30.1
14	15.8	17.8	63.6*	20.7	22.0	24.3	16.7	20.8
15	35.3*	37.5*	15.7	33.6	23.9	21.1	23.7	15.3

TABLE C-35

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR ETHYL BENZENE ANALYSIS BY WATER TYPE
MEDIUM YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	3	4	3	4	3	4	3	4
TRUE CONC:	162.0	170.0	162.0	170.0	162.0	170.0	162.0	170.0
LAB NUMBER								
1	225.0	209.0	129.8	195.0	181.0	228.0	185.0	198.7
2	179.0	215.6	157.6	234.3*	220.2	185.1	198.5	246.0
3	184.1	187.7	191.4	177.3	199.2	228.3	200.0	199.8
4	187.3	151.3	153.3	158.2	202.2	158.0	129.1	303.3
5	151.0	141.0	143.0	174.0	176.8	154.0	140.6	100.6
6	135.0	112.0	110.0*	125.0*	150.0	160.0	122.0*	62.9*
7	77.0	125.0	98.0*	78.6*	102.0*	113.0*	94.7*	103.0*
8	169.0	180.2	141.1	183.1	236.6	163.8	180.3	185.3
9	187.0	178.0	231.0	178.0	181.0	173.0	198.0	189.0
10	127.2	128.5	121.4	152.8	129.9	140.0	153.2	113.8
11	173.2	158.3	165.1	164.4	143.9	149.0	117.6	142.0
12	206.0	216.0	146.0	181.0	165.0	192.0	184.0	268.0
13	149.4	*	591.6*	181.5*	241.5	177.5	165.9	230.7
14	157.5	165.0	235.9	174.8	192.1	187.4	161.1	147.8
15	207.2	139.5	177.8	181.0	181.6	164.8	145.4	157.9

TABLE C-36

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR ETHYL BENZENE ANALYSIS BY WATER TYPE
HIGH YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	5	6	5	6	5	6	5	6
TRUE CONC:	680.0	612.0	680.0	612.0	680.0	612.0	680.0	612.0
LAB NUMBER								
1	687.0	620.0	485.0	824.0	688.0	813.0	825.0	711.7
2	1035.6	1041.0	865.3	883.5	1102.0	925.8	1160.8	975.6
3	763.1	658.2	683.6	679.7	804.7	745.4	591.0	822.2
4	468.9	488.3	109.3	478.8	498.0	511.5	116.8	574.0
5	553.0	549.0	618.0	684.0	733.0	538.0	599.6	441.6
6	638.0	387.0	462.0*	428.0*	559.0	503.0	261.4*	479.0*
7	285.0	421.0	317.0*	408.0*	684.0*	460.0*	370.0*	421.0*
8	732.6	587.0	603.6	631.3	662.2	735.2	726.1	599.2
9	564.0	874.0	969.0	514.0	439.0	530.0	741.0	631.0
10	424.4	362.6	462.6	370.4	374.2	385.9	396.1	355.3
11	813.0	616.0	706.0	901.0	643.0	563.0	709.0	547.0
12	622.0	683.0	557.0	818.0	683.0	544.0	736.0	513.0
13	546.4	544.7	1037.4*	858.5*	558.6	543.8	951.2	540.1
14	760.2	646.7	661.7	536.1	390.3	742.4	588.2	677.5
15	726.8	752.6	378.5	763.8	706.7	529.3	430.9	473.7

TABLE C-37

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR METHYLENE CHLORIDE ANALYSIS BY WATER TYPE
LOW YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	1	2	1	2	1	2	1	2
TRUE CONC:	8.0	7.2	8.0	7.2	8.0	7.2	8.0	7.2
LAB NUMBER								
1	2.2	3.2	6.2	16.5	19.4	14.2	13.0	7.5
2	0.0*	23.8	57.1*	25.9*	2.5	4.1	0.0*	11.3
3	8.0	6.1	6.9	5.3	21.6	4.6	5.4	14.0
4	19.1	22.6	33.6	22.6	27.8	36.7	21.8	136.6*
5	2.0	8.3	6.7	6.2	2.7	8.0	0.0*	0.0*
6	3.9*	5.0*	7.3	10.3	0.0*	4.8*	2.7	4.8
7	22.1	0.0*	0.0*	13.0	5.9	11.8	10.6	2.1
8	9.7	8.2	16.7	12.5	13.7	59.5	9.7*	223.6*
9	9.6	6.8	7.4	6.5	9.1	6.7	7.3	5.7
10	2.1	6.0	7.4	2.2	*	4.8	0.0*	0.0*
11	7.2	6.8	5.7	4.4	7.6	9.2	12.4	12.7
12	5.2	5.6	6.7	29.3	0.0*	3.7	0.0*	2.8
13	3.4	50.2*	1.5	0.0*	3.6	24.3	20.7	1.8
14	8.4	8.2	35.0	7.3	402.9*	37.3	0.0*	2.0
15	5.1	0.1	0.0*	134.9*	690.6*	0.0*	0.0*	1.5

TABLE C-38

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR METHYLENE CHLORIDE ANALYSIS BY WATER TYPE
MEDIUM YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	3	4	3	4	3	4	3	4
TRUE CONC:	120.0	114.0	120.0	114.0	120.0	114.0	120.0	114.0
LAB NUMBER								
1	81.1	54.9	91.2	57.9	116.3	64.3	82.4	63.0
2	164.9	75.0	279.8*	123.8*	139.9	94.8	123.4	57.9
3	113.1	63.4	105.0	65.8	99.0	106.8	124.1	46.9
4	93.4	52.0	97.8	62.0	125.8	104.7	165.7	33.2
5	63.1	60.0	75.3	54.4	89.4	66.5	0.0*	0.0*
6	28.6*	35.1*	46.2	43.4	62.4*	16.3*	36.2	22.2
7	73.1	106.0	58.1	77.8	83.9	75.8	96.5	66.5
8	113.5	83.5	81.1	81.8	117.5	116.4	267.5*	119.5*
9	116.4	104.4	108.1	111.1	105.0	93.0	129.5	106.5
10	80.4	45.6	29.5	79.5	75.5	*	77.0	40.4
11	138.4	105.8	166.3	106.1	134.3	112.1	95.1	110.5
12	143.0	96.4	119.0	134.0	74.7	78.5	101.0	74.0
13	86.4	*	146.6	71.7	88.4	193.1*	107.5	15.4
14	143.1	72.2	186.1	73.4	150.9	293.4*	124.4	54.7
15	71.9	43.9	636.0*	32.5	0.0*	0.0*	77.0	22.6

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TABLE C-39

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR METHYLENE CHLORIDE ANALYSIS BY WATER TYPE
HIGH YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	5	6	5	6	5	6	5	6
TRUE CONC:	432.0	480.0	432.0	480.0	432.0	480.0	432.0	480.0
LAB NUMBER								
1	621.8	532.8	1508.4*	1323.5*	550.3	438.3	437.0	6138.9*
2	660.4	939.9*	1075.7*	709.6*	476.9	863.8*	737.4	711.1
3	341.6	445.4	340.7	480.8	351.2	473.6	298.7	351.5
4	264.9	336.5	188.4	152.1	242.7	292.1	361.6	56.2
5	277.1	321.0	333.4	348.4	327.9	279.9	0.0*	0.0*
6	151.1*	231.1*	156.0	245.0	120.6*	262.6*	165.7	212.9
7	232.0	309.0	315.0	236.0	363.0	347.0	318.0	290.0
8	382.9	416.1	294.3	483.0	365.0	427.2	439.1*	618.8*
9	341.4	501.4	383.1	393.1	304.0	358.0	236.5	409.5
10	290.5	201.0	289.6	111.3	2421.4*	305.9	248.5	241.3
11	552.0	574.0	450.0	545.0	503.0	523.0	485.0	516.0
12	392.0	491.0	452.0	485.0	409.0	529.0	435.0	577.0
13	207.4	354.1	322.8	653.2	778.4	348.6	83.2	397.8
14	639.7	556.3	469.8	629.6	120.8	1103.2*	408.5	384.1
15	265.2	280.5	206.5	312.8	1216.2*	0.0*	253.1	147.3

TABLE C-40

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR TETRACHLOROETHENE ANALYSIS BY WATER TYPE
LOW YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	1	2	1	2	1	2	1	2
TRUE CONC:	9.0	10.0	9.0	10.0	9.0	10.0	9.0	10.0
LAB NUMBER								
1	10.1	14.3	12.2	10.6	11.4	14.9	12.9	9.9
2	13.3*	12.9*	9.4	14.9	7.6	16.1	8.3*	15.9*
3	10.2	10.6	9.1	10.8	11.5	11.9	9.3	12.0
4	9.9	10.0	8.9	10.2	8.1	11.8	10.0	3.3
5	9.9	9.0	9.6	8.8	10.4	9.2	12.0	0.0*
6	9.1	11.5	7.2	9.0	11.4	9.5	7.0	8.4
7	7.8*	5.9*	5.0*	7.9*	5.0*	6.7*	5.6	8.3
8	8.1	11.7	9.6	7.7	13.7	12.7	15.0	10.3
9	10.6	10.3	10.1	22.6*	8.9	10.6	9.8	10.2
10	6.6*	11.8*	9.8	8.4	10.0	11.3	7.1	10.5
11	10.1	10.8	9.1	8.9	9.7	10.8	10.5	10.3
12	11.1	12.6	13.9	7.6	11.1	13.1	9.0	9.6
13	12.4	12.2	12.0*	28.6*	32.7*	12.1	10.1	14.5
14	9.2	11.3	37.8*	9.2	10.6	12.8	8.0	11.1
15	24.6*	20.8*	9.8	14.9	10.8	12.5	15.4	4.9

TABLE C-41

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR TETRACHLOROETHENE ANALYSIS BY WATER TYPE
MEDIUM YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	3	4	3	4	3	4	3	4
TRUE CONC:	95.0	100.0	95.0	100.0	95.0	100.0	95.0	100.0
LAB NUMBER								
1	127.6	118.6	71.4	111.0	105.0	123.0	98.4	114.4
2	123.9*	123.9*	92.7	141.3	114.6	127.0	129.2*	142.5*
3	99.4	103.6	100.7	96.8	107.2	124.5	109.3	53.8
4	99.0	114.6	95.4	90.6	112.9	83.4	51.0	121.7
5	96.8	85.1	85.1	98.3	89.1	104.0	65.0	0.0*
6	95.1	77.2	66.7	77.7	83.2	107.0	78.5	30.6
7	59.4*	76.6*	63.2*	58.2*	58.3*	65.5*	73.2	69.6
8	107.5	104.5	75.9	107.7	152.5	111.3	104.1	137.1
9	111.0	104.0	200.0*	110.0	97.6	100.0	116.0	112.0
10	63.1*	60.9*	53.0	81.6	62.5	69.5	72.1	52.0
11	100.2	99.5	94.1	98.7	91.6	94.4	68.9	88.0
12	136.0	142.0	78.2	107.0	95.2	128.0	96.3	168.0
13	98.0	*	413.6*	98.4*	297.5*	103.9	89.8	125.5
14	117.8	119.5	137.7	102.1	108.8	104.2	96.1	83.1
15	152.2	103.5	133.3	119.3	98.1	98.7	58.1	129.5

TABLE C-42

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR TETRACHLOROETHENE ANALYSIS BY WATER TYPE
HIGH YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	5	6	5	6	5	6	5	6
TRUE CONC:	400.0	360.0	400.0	360.0	400.0	360.0	400.0	360.0
LAB NUMBER								
1	416.6	364.6	278.0	476.0	397.0	446.0	458.4	404.4
2	531.3*	708.2*	562.4	456.2	538.6	671.7	612.9*	662.0*
3	398.3	343.4	357.8	351.4	434.2	381.3	320.3	224.0
4	347.6	402.9	344.6	375.4	406.2	381.0	300.6	341.9
5	441.0	313.0	384.0	367.0	397.0	359.0	319.0	230.0
6	411.0	232.0	270.0	243.0	349.0	310.0	142.2	272.0
7	206.0*	260.0*	220.0*	274.0*	393.0*	262.0*	271.0	277.0
8	424.6	358.9	297.1	360.5	408.3	422.6	404.6	411.2
9	339.0	373.0	676.0	308.0	293.0	279.0	288.0	297.0
10	183.2*	145.8*	200.5	142.7	150.5	164.7	164.7	134.6
11	479.0	365.0	410.0	476.0	377.0	333.0	399.0	315.0
12	374.0	408.0	291.0	490.0	351.0	327.0	362.0	272.0
13	315.9	338.1	764.9*	551.2*	319.5	686.5	497.2	308.8
14	473.6	400.5	394.1	350.5	211.3	402.4	355.9	353.6
15	466.4	503.5	361.2	460.5	390.2	383.0	269.0	446.0

TABLE C-43

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR TOLUENE ANALYSIS BY WATER TYPE
LOW YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	1	2	1	2	1	2	1	2
TRUE CONC:	13.5	15.0	13.5	15.0	13.5	15.0	13.5	15.0
LAB NUMBER								
1	14.8	18.8	18.6	14.5	14.9	26.9*	18.6	14.0
2	17.7*	19.8*	16.1	22.2	11.9	21.6	13.4*	23.0*
3	15.0	16.7	13.0	15.3	16.5	18.7	17.3	31.2*
4	16.6	16.3	16.5	20.9	10.2	17.3	17.5	18.2
5	13.6	13.7	17.6	15.6	13.6	16.5	35.3*	0.0*
6	13.3	15.5	12.2	14.2	16.3	14.3	10.7	14.2
7	14.2*	9.2*	8.2*	12.3*	8.6*	11.4*	8.2*	13.2*
8	15.0	18.0	16.0	14.4	17.6	16.5	20.2	18.5
9	18.4	17.5	16.5	25.7	15.6	17.2	15.7	17.7
10	12.0	18.8	16.9	14.5	16.0	18.0	12.8	15.7
11	15.3	15.0	14.6	13.7	14.3	16.6	15.7	15.0
12	13.7	17.2	13.0	12.2	14.7	17.6	12.2	10.9
13	14.2	19.7	16.5	30.9	21.4	17.5	14.5	21.0
14	16.5	16.1	50.7*	16.9	16.4	19.3	12.4	15.6
15	23.9*	27.3*	15.4	21.8	16.2	18.6	18.4	13.7

TABLE C-44

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR TOLUENE ANALYSIS BY WATER TYPE
MEDIUM YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	3	4	3	4	3	4	3	4
TRUE CONC:	142.0	150.0	142.0	150.0	142.0	150.0	142.0	150.0
LAB NUMBER								
1	219.0	191.0	109.6	182.9	153.0	241.0*	164.6	177.2
2	173.2*	196.7*	153.5	223.6*	188.4	175.4	182.6*	223.6*
3	152.9	178.1	154.7	148.4	180.7	191.8	214.4	135.1
4	150.9	184.4	138.5	137.7	176.6	149.4	60.4	153.3
5	130.0	130.0	127.0	159.0	157.7	137.0	146.8	110.8
6	133.5	121.5	110.0	120.0	139.8	155.1	122.4	74.3
7	86.4*	114.0*	96.8*	89.1*	89.9*	96.8*	99.4*	97.9*
8	150.4	162.3	131.8	165.2	188.2	147.2	165.5	181.8
9	175.0	172.0	249.0*	179.0	155.0	158.0	178.1	184.1
10	104.5	106.9	96.7	132.1	106.1	119.6	122.0	96.5
11	146.4	130.8	139.9	142.6	117.1	124.9	97.5	119.5
12	185.0	195.0	123.0	161.0	153.0	173.0	158.0	215.0
13	118.4	*	464.6*	161.2	205.8	152.9	134.0	191.7
14	168.9	161.3	200.5	151.6	166.4	161.1	139.3	126.7
15	191.0*	156.2*	165.4	166.9	148.9	141.3	124.6	152.3

TABLE C-45

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR TOLUENE ANALYSIS BY WATER TYPE
HIGH YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	5	6	5	6	5	6	5	6
TRUE CONC:	600.0	540.0	600.0	540.0	600.0	540.0	600.0	540.0
LAB NUMBER								
1	646.0	541.0	411.0	724.9	564.0	794.0	690.6	617.2
2	882.3*	971.0*	878.1	771.6	935.1	826.9	1003.7*	879.6*
3	686.4	542.6	558.5	551.5	740.3	613.0	531.5	494.8
4	204.6	590.3	494.3	554.6	557.6	576.3	340.6	434.5
5	485.0	480.0	537.0	596.0	640.0	483.0	541.8	454.8
6	497.5	374.5	374.0	363.0	356.3	514.1	327.6	421.4
7	265.0*	355.0*	304.0*	346.0*	477.0*	355.0*	331.0*	340.0*
8	562.2	484.6	475.9	508.8	535.1	564.4	535.6	562.9
9	520.0	618.0	841.0	500.0	454.0	447.0	482.1	504.1
10	258.4	224.9*	273.1	212.8	228.8	244.7	230.6	202.1*
11	677.0	523.0	576.0	628.0	542.0	474.0	572.0	468.0
12	567.0	559.0	511.0	684.0	622.0	494.0	676.0	453.0
13	413.1	434.9	807.5	720.0	496.1	435.4	812.5	443.2
14	682.7	575.6	573.2	476.0	326.9	674.0	515.4	639.2
15	701.7*	633.9*	427.2	713.3	518.8	576.0	453.0	441.3

TABLE C-46

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR TRANS-1,2-DICHLOROETHENE ANALYSIS BY WATER TYPE
LOW YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	1	2	1	2	1	2	1	2
TRUE CONC:	5.0	4.5	5.0	4.5	5.0	4.5	5.0	4.5
LAB NUMBER								
1	2.8	3.5	4.2	3.0	4.0	3.5	3.9	3.6
2	5.1	6.2	4.5	7.2	4.6	5.8	5.1	5.3
3	4.8	3.8	4.3	3.9	4.7	3.8	3.6	4.9
4	6.0	4.7	5.4	6.4	3.8	8.7*	37.8*	37.9*
5	5.5	5.7	6.3	5.2	4.0	3.6	13.8*	5.7
6	4.7	6.7	6.1	5.1	6.6	4.7	5.0	4.3
7	4.3	2.6	2.7*	4.0*	4.4	3.3	3.5	3.3
8	5.9	5.1	6.4	4.8	4.4	4.1	7.7*	6.1*
9	6.1	5.0	6.1	5.4	5.7	5.3	5.8	6.0
10	4.4	4.9	5.4	4.5	5.6	4.7	5.2	4.3
11	4.1	3.7	2.9	2.5	4.3	3.6	4.3	3.1
12	5.1	5.5	4.5	1.5	5.5	6.0	6.4	5.3
13	6.2	6.4	5.5*	8.8*	7.7	5.5	4.7	4.5
14	5.8	3.7	20.4*	5.0	7.7	5.2	5.7	4.6
15	10.6*	5.7	4.7	4.8	4.0	6.2	1.5	4.8

TABLE C-47

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR TRANS-1,2-DICHLOROETHENE ANALYSIS BY WATER TYPE
MEDIUM YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	3	4	3	4	3	4	3	4
TRUE CONC:	75.0	71.0	75.0	71.0	75.0	71.0	75.0	71.0
LAB NUMBER								
1	71.9	49.0	72.5	52.3	71.4	51.0	67.0	48.0
2	93.7	50.7	103.1	63.2	86.5	48.6	75.5	39.5
3	74.4	45.6	78.0	41.9	74.7	62.9	97.5	75.9
4	75.5	68.0	81.1	75.7	135.4*	62.4	102.5*	117.3*
5	79.9	49.2	70.9	56.5	82.2	58.3	92.4	60.8
6	67.1	51.0	78.0	56.1	65.1	59.4	79.8	33.8
7	54.1	68.0	62.6*	51.6*	66.4	49.6	78.8	57.2
8	95.1	54.9	92.8	73.7	95.9	57.4	103.2*	105.4*
9	95.1	82.1	92.4	87.8	79.8	81.1	100.0	94.1
10	78.6	60.4	66.0	71.2	69.0	64.0	78.7	63.4
11	85.0	41.1	91.2	36.6	77.3	45.0	57.9	48.8
12	101.0	64.4	62.6	77.5	89.4	72.3	69.7	64.0
13	76.5	*	248.2*	58.0*	105.3	56.9	73.6	61.6
14	83.3	37.4	121.1	51.0	95.1	78.1	86.5	53.3
15	66.0	54.4	94.6	50.3	50.8	42.9	78.5	19.9

TABLE C-48

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR TRANS-1,2-DICHLOROETHENE ANALYSIS BY WATER TYPE
HIGH YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	5	6	5	6	5	6	5	6
TRUE CONC:	270.0	300.0	270.0	300.0	270.0	300.0	270.0	300.0
LAB NUMBER								
1	220.0	269.0	228.0	250.0	230.0	249.0	236.0	261.0
2	412.9	430.3	425.3*	416.4	404.1*	396.5	473.7*	369.7
3	259.3	302.2	257.9	319.0	268.3	310.8	235.2	449.0
4	332.3	353.2	302.5	438.3	194.7	407.5	341.8*	401.8*
5	293.0	307.0	283.0	317.0	281.0	306.0	282.0	277.0
6	336.0	261.0	262.0	344.0	278.0	282.0	201.8	319.0
7	158.0	249.0	214.0*	243.0*	274.0	282.0	259.0	250.0
8	279.3	365.8	317.1	436.1	268.3	384.4	400.0*	414.9*
9	267.0	383.0	321.0	317.0	264.0	284.0	259.0	396.0
10	277.2	265.9	274.6	258.0	259.0	267.9	253.1	297.5
11	311.0	332.0	262.0	324.0	270.0	286.0	279.0	282.0
12	274.0	343.0	310.0	312.0	276.0	309.0	316.0	330.0
13	206.6	294.7	450.6*	464.9*	253.8	340.1	356.2	305.7
14	348.9	301.1	278.6	349.1	192.2	397.7	270.1	266.7
15	288.8	214.3	290.7	345.2	236.4	341.6	313.1	108.6

TABLE C-49

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR TRANS-1,3-DICHLOROPROPENE ANALYSIS BY WATER TYPE
LOW YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	1	2	1	2	1	2	1	2
TRUE CONC:	9.4	10.4	9.4	10.4	9.4	10.4	9.4	10.4
LAB NUMBER								
1	4.1*	5.4*	5.4*	5.5*	6.0*	5.6*	5.3*	6.2*
2	8.3	10.0	7.1	10.1	6.3	9.7	6.8	10.0
3	17.1*	20.2*	18.4*	21.3*	18.4*	19.6*	14.4*	37.4*
4	6.3	4.8	4.8	7.0	7.9	6.6	9.1	7.9
5	7.9	6.8	5.7	6.7	6.9*	3.4*	6.6	7.4
6	0.0*	8.6	6.8	7.3	9.2	5.7	7.3	9.1
7	9.6	7.1	6.3	11.8	9.4	10.8	7.5	9.7
8	5.5	7.3	5.7	6.3	7.2	6.4	7.4	6.6
9	7.6	8.2	6.9	7.6	6.9	8.0	6.9	8.7
10	4.3	6.4	5.5	4.9	6.3*	5.3*	5.9	5.1
11	8.8	10.1	8.8	8.3	9.4	10.5	9.2	9.2
12	9.0	9.7	7.8	9.5	9.1	9.6	6.8	9.2
13	10.9	13.1	11.0	22.8*	14.0	12.2	8.4	9.7
14	14.3*	10.6*	30.9*	11.3	12.6	12.7	9.4*	12.3*
15	7.0	8.9	11.0	5.1	12.5	9.1	8.9	8.7

TABLE C-50

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR TRANS-1,3-DICHLOROPROPENE ANALYSIS BY WATER TYPE
MEDIUM YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	3	4	3	4	3	4	3	4
TRUE CONC:	99.0	104.0	99.0	104.0	99.0	104.0	99.0	104.0
LAB NUMBER								
1	65.5*	62.2*	74.4*	65.4*	71.9*	67.2*	62.0*	71.2*
2	82.9	75.8	80.1	93.2	78.4	82.3	85.8	80.2
3	198.4*	240.6*	237.5*	234.4*	228.7*	259.6*	199.3*	240.6*
4	79.2	74.3	58.3	66.6	79.5	84.1	65.1	108.5
5	77.6	67.9	68.2	56.2	45.9*	80.1*	72.7	78.1
6	87.9	13.0*	81.3	81.9	62.9	96.8	84.3	65.7
7	97.2	125.0	108.0	122.0	109.0	125.0	125.0	118.0
8	77.3	89.4	72.9	77.7	94.7	75.0	77.0	83.8
9	77.1	80.1	74.5	77.0	71.9	72.1	82.2	82.0
10	85.6	83.3	70.4	95.7	64.6*	93.2*	84.9	97.7
11	109.5	112.9	100.6	108.7	108.3	110.1	78.0	107.0
12	97.9	94.4	52.9	91.8	85.9	98.5	59.9	94.2
13	103.3	*	312.8*	102.2	138.0	131.7	95.3	64.5
14	142.1*	149.0*	163.2*	146.7	141.2	150.1	134.7*	188.9*
15	40.1*	82.6	90.2	126.9	97.8	80.7	107.9	83.6

TABLE C-51

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR TRANS-1,3-DICHLOROPROPENE ANALYSIS BY WATER TYPE
HIGH YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	5	6	5	6	5	6	5	6
TRUE CONC:	416.0	374.0	416.0	374.0	416.0	374.0	416.0	374.0
LAB NUMBER								
1	245.0*	207.0*	218.0*	205.0*	262.0*	194.0*	247.0*	223.0*
2	392.5	368.9	428.5	346.2	400.7	353.0	427.2	359.4
3	886.6*	678.9*	874.1*	815.8*	863.3*	884.7*	885.7*	865.8*
4	254.1	265.8	253.8	253.9	312.0	239.6	300.8	355.9
5	286.0	204.0	263.0	226.0	191.0*	210.0*	330.0	201.0
6	426.0	46.8	345.0	313.0	342.0	215.0	282.3	314.0
7	308.0	328.0	365.0	334.0	472.0	351.0	372.0	340.0
8	413.5	285.0	298.3	287.4	305.0	311.8	323.0	289.7
9	250.0	310.0	293.0	238.0	260.0	221.0	244.0	277.0
10	163.0	149.4	179.1	120.8	174.2*	114.8*	155.6	183.1
11	453.0	398.0	442.0	426.0	424.0	372.0	431.0	356.0
12	390.0	320.0	388.0	363.0	385.0	320.0	332.0	319.0
13	250.6	287.9	477.9	243.4	227.8	320.6	384.7	259.2
14	467.8*	363.1*	406.8	337.9	272.8	447.7	416.6*	426.7*
15	315.2	126.9	424.2	232.8	285.9	270.5	378.2	232.7

TABLE C-52

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR TRICHLOROETHENE ANALYSIS BY WATER TYPE
LOW YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	1	2	1	2	1	2	1	2
TRUE CONC:	6.0	5.4	6.0	5.4	6.0	5.4	6.0	5.4
LAB NUMBER								
1	7.3	9.4	8.3	7.8	9.0	7.0	8.6	12.5
2	9.8*	13.2*	7.1	11.8	7.0	13.6	7.9	10.6
3	8.3	7.1	7.1	7.2	7.4	7.4	6.6	16.3
4	8.1	7.4	6.4	9.2	11.4	10.3	105.0*	76.1*
5	6.9	7.4	6.2	5.8	8.2	13.5	0.0*	0.0*
6	9.9	8.1	5.9	6.1	8.5	5.4	6.0	6.9
7	4.6*	3.3*	3.3*	5.3*	5.2*	2.2*	4.4	4.6
8	5.7	7.0	6.5	4.7	8.1	6.3	8.8	5.7
9	8.6	7.3	7.3	9.7	6.8	8.6	7.0	7.2
10	5.4*	7.0*	6.8	6.2	6.4*	6.1*	6.1	6.5
11	6.7	6.3	6.1	5.6	6.7	6.1	7.0	5.6
12	9.9	9.8	9.9	8.2	7.0	10.3	6.7	8.0
13	9.3	10.9	9.5	20.4*	12.2	10.9	7.1	8.0
14	12.3*	19.1*	53.3*	6.7	13.6	10.0	18.2*	16.3*
15	6.0	11.3	8.4	10.1	6.7	4.6	4.6	2.2

TABLE C-53

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR TRICHLOROETHENE ANALYSIS BY WATER TYPE
MEDIUM YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	3	4	3	4	3	4	3	4
TRUE CONC:	90.0	86.0	90.0	86.0	90.0	86.0	90.0	86.0
LAB NUMBER								
1	111.0	96.6	104.6	97.6	106.0	95.3	107.0	165.0
2	119.4*	106.8*	89.6	129.5	107.5	106.5	129.8	136.4
3	94.9	93.6	98.5	89.2	97.9	95.5	98.8	113.7
4	91.2	91.7	85.4	100.2	146.5	132.9	142.5*	227.1*
5	104.0	76.1	79.7	75.9	81.8	101.0	74.6	75.9
6	96.4	94.9	75.5	68.9	66.0	93.1	80.4	45.1
7	60.8*	70.7*	68.6*	63.0*	70.0*	65.9*	83.4	68.1
8	101.8	86.1	70.6	90.0	132.8	91.0	91.5	113.4
9	108.0	89.9	128.0	97.0	94.4	85.6	106.0	97.4
10	71.5*	60.8*	58.6	71.8	60.0*	61.1*	74.5	57.6
11	98.4	85.6	92.1	87.8	89.0	83.6	66.4	81.8
12	132.0*	113.0	71.9	98.1	109.0	116.0	61.4	140.0
13	101.7	*	322.9*	81.5	125.3	104.8	85.5	78.5
14	217.0*	98.3*	150.6	76.2	108.7	127.1	212.8*	192.9*
15	37.7*	114.0	132.0	126.9	73.3	74.4	74.3	80.6

TABLE C-54

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR TRICHLOROETHENE ANALYSIS BY WATER TYPE
HIGH YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	5	6	5	6	5	6	5	6
TRUE CONC:	324.0	360.0	324.0	360.0	324.0	360.0	324.0	360.0
LAB NUMBER								
1	384.0	394.0	359.0	413.0	361.0	380.0	378.0	648.0
2	448.6*	642.4*	393.3	542.4	476.5	576.6*	533.4	581.2
3	317.1	339.2	300.0	342.8	304.6	344.7	306.5	390.5
4	357.3	358.9	323.9	401.3	348.3	260.5	383.5*	513.8*
5	352.0	297.0	272.0	359.0	276.0	382.0	395.2	250.2
6	348.9	23.7*	240.0	259.0	283.5	279.5	184.8	270.0
7	165.0*	219.0*	192.0*	241.0*	282.0*	259.0*	237.0	255.0
8	331.7	362.1	255.5	580.0	342.7	424.3	343.1	434.0
9	306.0	421.0	462.0	342.0	285.0	309.0	271.0	392.0
10	195.1*	195.1*	194.1	180.1	158.6*	191.1*	182.4	170.5
11	365.0	374.0	329.0	389.0	321.0	330.0	321.0	323.0
12	368.0	395.0	343.0	530.0	373.0	376.0	377.0	306.0
13	161.2*	261.1	395.7	347.6	220.3	262.3	239.8	221.9
14	629.1*	361.9*	214.7	298.7	190.4	403.9	724.7*	438.3*
15	383.4	163.2	268.2	551.1	249.8	351.4	238.6	330.0

TABLE C-55

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR TRICHLOROFLUOROMETHANE ANALYSIS BY WATER TYPE
LOW YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	1	2	1	2	1	2	1	2
TRUE CONC:	8.0	7.2	8.0	7.2	8.0	7.2	8.0	7.2
LAB NUMBER								
1	4.8	4.2	4.8	4.2	5.2	4.9	4.7	4.7
2	23.6*	23.6*	24.4*	22.7*	19.6*	22.7*	19.1*	17.6*
3	7.0	6.9	6.2	6.0	7.4	6.0	7.0	7.4
4	7.7	5.1	7.0	5.6	3.5	7.7	7.5	7.1
5	10.8	7.1	5.4	8.1	8.4	3.4	8.3	8.1
6	10.5	11.3	9.4	10.5	11.8	7.7	9.0	7.3
7	3.1*	2.2*	2.0*	3.3*	3.8*	2.3*	2.8*	1.9*
8	6.8	5.2	10.3	7.2	5.6	4.4	9.5	8.8
9	10.6	8.7	10.1	9.0	10.0	8.1	10.1	9.8
10	2.8*	2.9*	4.4*	3.8*	3.4*	3.3*	4.1*	2.6*
11	*	*	*	*	*	*	*	*
12	10.8	10.5	9.7	0.0*	10.3	9.9	9.4	9.9
13	7.9	9.4	5.7	12.3	10.8	6.6	7.1	5.9
14	8.0	7.0	29.9*	7.4	8.2	7.0	6.5	6.8
15	23.3*	4.6	9.2	7.2	5.9	5.0	9.4	8.0

TABLE C-56

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR TRICHLOROFLUOROMETHANE ANALYSIS BY WATER TYPE
MEDIUM YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	3	4	3	4	3	4	3	4
TRUE CONC:	120.0	114.0	120.0	114.0	120.0	114.0	120.0	114.0
LAB NUMBER								
1	84.1	51.3	87.9	56.1	87.4	60.3	70.4	54.4
2	345.5*	225.2*	362.3*	196.3*	360.4*	159.5*	259.5*	192.1*
3	103.6	75.8	111.6	59.8	113.0	96.7	165.0	63.6
4	79.8	79.6	92.6	49.3	92.8	41.7	126.3	101.0
5	151.0	74.8	123.0	59.5	64.1	107.0	151.0	95.1
6	144.0	104.0	155.0	130.0	115.8	123.0	155.0	72.6
7	50.6*	50.0*	50.2*	47.5*	61.5*	36.1*	61.2*	35.1*
8	97.6	44.9	150.2	130.9	116.5	69.9	152.2	132.0
9	167.0	157.0	166.0	138.0	145.0	132.0	175.0	148.0
10	45.8*	40.9*	56.4*	47.7*	52.0*	40.4*	48.1*	51.6*
11	*	*	*	*	*	*	*	*
12	149.0	112.0	97.1	106.0	137.0	103.0	105.0	92.6
13	98.6	*	315.6*	84.4	143.2	72.7	104.3	74.0
14	127.7	74.9	184.8	77.4	135.5	92.1	138.0	65.3
15	211.0	62.4	135.5	70.0	65.3	80.1	163.5	88.9

TABLE C-57

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR TRICHLOROFLUOROMETHANE ANALYSIS BY WATER TYPE
HIGH YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	5	6	5	6	5	6	5	6
TRUE CONC:	432.0	480.0	432.0	480.0	432.0	480.0	432.0	480.0
LAB NUMBER								
1	282.0	287.0	267.0	283.0	284.0	312.0	259.0	309.9
2	1588.9*	1704.1*	1442.8*	1234.8*	1391.8*	1509.0*	1409.0*	1478.2*
3	437.7	428.0	373.0	449.4	380.7	478.0	383.7	862.4
4	298.9	348.3	279.2	275.4	163.7	302.5	376.2	419.1
5	558.0	431.0	458.0	348.0	24.7	557.0	505.0	533.0
6	74.1	526.0	603.0	738.0	557.0	470.0	369.6	674.0
7	146.0*	195.0*	199.0*	190.0*	196.0*	273.0*	210.0*	174.0*
8	310.2	380.9	507.3	733.0	310.8	445.1	654.1	500.4
9	475.0	776.0	589.0	525.0	430.0	525.0	431.0	612.0
10	160.8*	176.3*	186.0*	223.1*	161.8*	200.0*	159.0*	262.5*
11	*	*	*	*	*	*	*	*
12	412.0	593.0	458.0	464.0	447.0	462.0	409.0	521.0
13	321.7	418.2	621.1	663.7	327.7	487.9	425.3	380.8
14	491.8	508.7	410.8	494.3	271.0	576.2	402.5	387.0
15	355.6	854.8	295.7	552.1	418.6	305.2	526.4	467.6

TABLE C-58

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR 1,1-DICHLOROETHANE ANALYSIS BY WATER TYPE
LOW YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	1	2	1	2	1	2	1	2
TRUE CONC:	10.8	12.0	10.8	12.0	10.8	12.0	10.8	12.0
LAB NUMBER								
1	9.8	9.7	9.2	10.1	9.9	12.2	8.9	11.4
2	18.0*	21.8*	30.9*	21.7*	12.3*	19.4*	16.3	17.3
3	11.2	12.3	11.0	12.4	10.9	12.5	10.8	20.7
4	13.3	12.5	12.3	16.1	6.8	17.2	10.3	6.8
5	13.0	12.7	9.1	12.2	11.9	9.5	15.6	15.6
6	10.5	13.7	10.5	14.1	11.8	12.1	10.0	11.6
7	10.0	7.3	6.3*	11.5*	9.8*	9.9*	8.2	9.2
8	13.2	15.9	13.7	11.9	11.8	11.6	19.0	16.5
9	14.5	14.8	14.7	15.3	13.2	14.2	13.2	16.3
10	7.5	9.8	8.9	8.7	8.9	9.1	9.2	8.1
11	11.6	13.0	10.9	11.2	11.9	13.1	12.2	11.7
12	9.9	14.0	8.3	6.9	11.9	13.8	11.1	13.5
13	13.7	21.9*	15.0*	26.2*	18.1	14.4	11.9	13.4
14	12.7	13.4	30.5*	13.3	16.1	14.6	11.7	13.6
15	17.5	13.7	11.2	16.7	10.5	14.6	3.0	12.0

TABLE C-59

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR 1,1-DICHLOROETHANE ANALYSIS BY WATER TYPE
MEDIUM YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	3	4	3	4	3	4	3	4
TRUE CONC:	114.0	120.0	114.0	120.0	114.0	120.0	114.0	120.0
LAB NUMBER								
1	128.0	78.7	138.1	90.5	126.0	104.0	99.2	85.2
2	206.8*	121.9*	293.6*	145.9*	159.2*	100.3*	117.1	102.0
3	122.5	82.1	129.1	75.6	123.4	110.8	174.3	124.3
4	119.1	118.1	118.5	107.7	148.8	92.2	118.5	137.2
5	121.0	83.3	115.0	76.7	102.4	111.0	128.0	106.0
6	98.1	88.0	120.0	100.0	111.5	96.7	121.0	68.8
7	83.4	113.0	97.1*	91.0*	102.0*	87.2*	117.0	96.6
8	139.1	89.9	118.5	114.2	140.7	95.5	123.4	179.1
9	148.0	149.0*	144.0	162.0*	132.0	140.0	160.0	166.0
10	111.8	93.1	94.3	103.0	98.0	93.6	107.0	99.0
11	132.4	110.0	133.4	105.2	128.6	117.3	93.2	114.6
12	132.0	98.6	91.8	125.0	121.0	107.0	104.0	77.2
13	126.4	*	395.9*	110.5*	155.9	108.9	127.1	119.4
14	82.8	81.7	196.6*	84.3	148.0	133.0	140.1	90.7
15	88.8	94.4	141.9	103.2	88.7	85.4	147.2	47.3

TABLE C-60

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR 1,1-DICHLOROETHANE ANALYSIS BY WATER TYPE
HIGH YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	5	6	5	6	5	6	5	6
TRUE CONC:	480.0	432.0	480.0	432.0	480.0	432.0	480.0	432.0
LAB NUMBER								
1	527.0	368.0	461.0	357.0	483.0	429.0	423.0	406.0
2	987.7*	939.6*	1666.4*	825.2*	793.3*	680.7*	1190.5*	560.9
3	479.1	454.8	482.3	484.6	496.6	463.2	417.5	799.8
4	562.7	521.3	513.2	547.9	367.5	525.6	549.8	528.4
5	570.0	410.0	489.0	378.0	399.0	428.0	597.0	424.0
6	557.0	419.0	423.0	497.0	391.0	421.0	411.9	443.0
7	205.0*	292.0	289.0*	271.0*	366.0*	319.0*	339.0	289.0
8	461.8	487.3	443.2	541.5	454.9	518.2	595.2	607.3
9	478.0	547.0	552.0	488.0	411.0	413.0	460.0	519.0
10	509.3	391.3	463.4	379.8	468.8	398.2	435.6	473.5
11	578.0	509.0	519.0	502.0	527.0	438.0	527.0	441.0
12	451.0	480.0	614.0	355.0	502.0	442.0	636.0	502.0
13	420.2	468.2	883.8*	717.7*	475.1	521.0	704.3	481.1
14	689.8	528.5	530.0	574.1	380.2	652.8*	533.9	408.3
15	531.6	340.3	513.6	505.3	487.7	469.7	530.3	225.0

TABLE C-61

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR 1,1-DICHLOROETHENE ANALYSIS BY WATER TYPE
LOW YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	1	2	1	2	1	2	1	2
TRUE CONC:	8.0	7.2	8.0	7.2	8.0	7.2	8.0	7.2
LAB NUMBER								
1	5.4	4.2	9.0	5.4	7.7	7.0	9.7	13.3
2	13.8	12.5	11.9*	18.3*	7.7	12.4	17.3*	11.3*
3	7.4	5.8	6.5	6.0	7.1	5.9	5.8	7.4
4	18.1	7.2	9.5	20.4	9.8	7.1	17.0*	9.2*
5	10.3	9.6	10.0	9.7	9.6	6.8	8.7	8.8
6	8.7	12.1	9.6	9.9	13.9	7.7	9.0	8.4
7	6.4	3.8	4.0*	5.7*	6.3*	4.9*	5.4	4.8
8	8.1	12.4	9.6	6.4	10.1	4.1	21.5*	8.7
9	14.5	16.7	16.1*	13.4	17.4*	14.3	14.9*	11.7
10	6.1	6.9	7.7	6.1	7.5	6.3	7.4	5.8
11	6.6	5.6	3.4*	4.5	6.1	5.5	6.2	4.6
12	9.3	10.0	9.0	0.0*	11.1	10.3	9.1	9.3
13	8.3	10.4	8.0	13.1	11.7	7.3	7.7	6.9
14	8.1	7.3	44.9*	7.3	9.1	6.8	7.3	6.4
15	25.1*	26.5*	9.9	11.2	8.3	11.3	6.8	11.7

TABLE C-62

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR 1,1-DICHLOROETHENE ANALYSIS BY WATER TYPE
MEDIUM YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	3	4	3	4	3	4	3	4
TRUE CONC:	120.0	114.0	120.0	114.0	120.0	114.0	120.0	114.0
LAB NUMBER								
1	107.0	60.1	113.6	65.6	102.0	71.5	89.4	62.3
2	209.4	83.8	222.1*	123.7*	130.6	71.1	144.9*	115.5*
3	89.9	52.4	93.7	44.8	93.8	81.0	102.8	18.1
4	133.5	92.5	136.0	98.7	138.6	99.1	133.7*	157.7*
5	122.0	69.8	119.0	81.6	116.9	93.5	120.0	92.3
6	64.9	58.0	132.0	84.9	98.8	88.8	122.0	47.7
7	74.7	89.6	82.6*	59.4*	85.0*	60.2*	111.0	70.5
8	198.7	77.2	102.1	92.9	196.1*	106.1	123.4	296.0*
9	88.0	83.8	96.9	83.5	90.7	84.9	102.0	85.6
10	103.9	69.4	88.8	88.7	87.5	72.3	97.2	72.8
11	117.1	76.4	143.5	67.0	116.0	83.5	77.1	82.6
12	141.0	90.6	83.8	93.2	121.0	91.1	92.2	77.8
13	80.0	*	290.9*	68.5	130.0	63.9	107.1	67.8
14	138.1	62.0	151.1	62.3	128.3	92.1	121.1	62.8
15	132.6	88.2	176.6	96.1	99.8	96.0	200.6*	46.1

TABLE C-63

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR 1,1-DICHLOROETHENE ANALYSIS BY WATER TYPE
HIGH YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	5	6	5	6	5	6	5	6
TRUE CONC:	432.0	480.0	432.0	480.0	432.0	480.0	432.0	480.0
LAB NUMBER								
1	401.0	471.0	379.0	412.0	401.0	473.0	379.0	471.0
2	870.6	1129.4	1088.0*	1032.5*	643.7	824.5	1161.5*	789.1*
3	364.1	454.8	372.0	475.9	340.2	475.8	340.2	513.1
4	1045.2	1257.3	1015.0*	2003.2*	1116.8*	2172.9*	1356.0*	1473.6*
5	520.0	550.0	476.0	576.0	499.0	561.0	538.0	525.0
6	656.0	420.0	495.0	642.0	531.0	483.0	381.1	596.0
7	200.0	324.0	271.0*	291.0*	350.0*	349.0*	333.0	327.0
8	541.0	881.2	428.6	636.8	575.0	822.9	561.1	1161.8*
9	286.0	328.0	340.0	356.0	295.0	330.0	278.0	424.0
10	376.6	359.4	378.2	347.4	351.7	358.7	339.8	410.4
11	433.0	496.0	297.0	417.0	381.0	388.0	399.0	358.0
12	417.0	528.0	458.0	468.0	445.0	469.0	569.0	500.0
13	321.0	447.5	659.8	687.7	362.2	493.3	461.1	462.5
14	495.1	505.0	404.4	498.2	247.8	584.7	390.1	406.5
15	560.6	634.3	523.2	781.1	571.7	665.9	687.7	325.5

TABLE C-64

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR 1,1,1-TRICHLOROETHANE ANALYSIS BY WATER TYPE
LOW YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	1	2	1	2	1	2	1	2
TRUE CONC:	9.0	10.0	9.0	10.0	9.0	10.0	9.0	10.0
LAB NUMBER								
1	7.5	9.8	8.9	9.1	8.6	9.8	9.3	10.5
2	11.6	14.9	11.7	14.0	9.0	13.0	9.4	11.9
3	8.0	8.7	7.6	8.9	8.5	9.2	22.0*	37.1*
4	12.3	12.2	10.3	14.3	7.3	15.2	12.3	11.1
5	11.9	12.3	4.7	10.0	8.7	3.8	0.0*	0.0*
6	8.3	11.9	7.6	11.8	8.9	9.4	7.3	7.9
7	6.8*	5.5*	4.4*	8.6*	7.4	8.1	6.2	7.7
8	10.2	10.1	11.4	10.4	8.7	9.9	14.2*	13.1*
9	12.1	12.6	11.4	14.7	10.5	12.9	11.0	13.6
10	7.0	10.5	8.5	8.7	9.8	10.0	10.8	9.7
11	10.2	11.3	9.1	9.4	10.4	11.7	13.1	12.0
12	10.3	12.4	10.2	9.3	21.4*	24.6*	10.7	11.9
13	11.2	15.0	9.4	24.1*	18.9*	14.6	9.2	10.8
14	10.0	9.5	30.7*	9.0	11.5	11.5	8.9	10.8
15	21.0*	13.1	9.6	11.6	9.3	10.2	0.0*	0.0*

TABLE C-65

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR 1,1,1-TRICHLOROETHANE ANALYSIS BY WATER TYPE
MEDIUM YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	3	4	3	4	3	4	3	4
TRUE CONC:	95.0	100.0	95.0	100.0	95.0	100.0	95.0	100.0
LAB NUMBER								
1	105.8	77.8	111.8	83.9	104.0	82.4	96.5	73.4
2	124.9	84.6	136.3	92.4	129.7	67.4	95.0	62.7
3	89.3	63.4	97.7	56.7	95.1	88.5	182.4*	187.2*
4	122.0	98.0	103.5	85.2	121.6	67.5	67.2	101.2
5	110.0	59.1	91.0	44.7	40.4	83.8	86.4*	0.0*
6	74.7	70.0	90.1	77.9	79.3	70.3	86.0	50.0
7	67.6*	84.9*	70.0*	78.1*	76.1	81.7	90.9	86.5
8	108.0	79.6	122.2	97.9	113.5	85.6	135.1*	142.3*
9	126.0	128.0	143.0	127.0	104.0	138.0	134.0	135.0
10	125.7	106.0	98.6	128.8	112.7	124.5	118.1	121.9
11	104.6	88.2	117.8	82.0	101.8	94.3	75.9	90.6
12	124.0	95.4	87.1	109.0	116.0	106.0	98.0	90.5
13	105.6	*	316.2*	101.6	146.3	129.5	92.8	103.1
14	103.0	71.8	150.3	76.8	126.5	108.9	118.3	77.9
15	123.7	120.6	133.7	106.2	103.8	108.7	67.3	89.5

TABLE C-66

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR 1,1,1-TRICHLOROETHANE ANALYSIS BY WATER TYPE
HIGH YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	5	6	5	6	5	6	5	6
TRUE CONC:	400.0	360.0	400.0	360.0	400.0	360.0	400.0	360.0
LAB NUMBER								
1	407.8	363.8	408.0	340.0	398.0	336.0	404.0	347.0
2	692.6	560.5	720.7	505.7	660.9	525.8	770.6*	494.4
3	385.9	340.3	377.5	374.1	389.0	376.9	410.3*	858.6*
4	476.7	396.3	427.8	471.4	308.4	257.9	377.7	430.9
5	470.0	300.0	371.0	217.0	181.0	359.0	357.4*	301.4*
6	446.0	317.0	390.0	447.0	361.0	303.0	259.3	391.0
7	213.0*	239.0*	249.0*	249.0*	363.0	276.0	303.0	273.0
8	467.5	411.7	464.8	529.2	108.3	421.9	587.8*	477.7*
9	414.0	473.0	570.0	382.0	399.0	337.0	390.0	436.0
10	586.7	434.2	627.1	436.6	607.0	469.6	526.8	588.6
11	466.0	399.0	409.0	406.0	423.0	351.0	454.0	369.0
12	399.0	374.0	481.0	391.0	421.0	376.0	548.0	404.0
13	215.6	266.9	471.1	338.7	306.9	325.0	371.1	233.3
14	502.1	476.9	440.9	332.8	332.9	553.0	448.4	376.9
15	464.2	303.2	352.2	583.4	365.3	353.5	290.8	346.3

TABLE C-67

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR 1,1,2-TRICHLOROETHANE ANALYSIS BY WATER TYPE
LOW YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	1	2	1	2	1	2	1	2
TRUE CONC:	10.8	12.0	10.8	12.0	10.8	12.0	10.8	12.0
LAB NUMBER								
1	10.6	13.0	11.7	12.5	13.2	12.4	13.0	13.5
2	12.7	15.7	9.8	16.4	10.0	16.0	9.0	17.2
3	12.9	14.4	12.9	14.9	12.2	13.3	10.9	19.4
4	12.9	13.1	10.2	13.0	15.9	14.5	17.9*	10.9
5	13.1	9.9	11.5	10.3	12.9	11.0	9.9	14.4
6	9.5	13.8	11.4	14.8	12.9	11.3	11.0	13.0
7	13.0	7.8	7.0*	11.3*	9.7*	5.6*	8.0*	11.0*
8	11.2	13.6	10.9	9.0	14.7	10.6	13.6	13.0
9	11.5	12.9	12.1	14.1	11.4	12.3	11.1	13.2
10	8.6	11.1	9.8*	9.3*	9.8*	9.5*	8.4*	10.1*
11	11.7	13.3	12.2	10.8	12.2	13.1	11.8	12.3
12	13.9*	15.5*	14.1	15.4	12.4	14.3	10.4	15.4
13	16.5	15.6	15.2	25.7	20.3*	18.5	12.0	12.3
14	11.7	11.1	40.4*	14.2	14.9	15.3	10.4	12.8
15	3.7*	49.5*	12.4	22.9	75.2*	26.5*	11.8	10.6

TABLE C-68

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR 1,1,2-TRICHLOROETHANE ANALYSIS BY WATER TYPE
MEDIUM YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	3	4	3	4	3	4	3	4
TRUE CONC:	114.0	120.0	114.0	120.0	114.0	120.0	114.0	120.0
LAB NUMBER								
1	129.0	127.0	132.7	128.0	137.0	132.0	126.0	144.0
2	133.4	139.0	116.7	151.9	135.5	135.6	139.8	143.4
3	123.8	145.2	136.5	139.4	133.5	140.0	108.8	124.1
4	114.5	124.8	108.4	117.7	197.4	156.2	99.3	184.3
5	144.0	114.0	109.0	106.0	101.4	152.0	114.0	155.2
6	120.0	90.3	103.0	124.0	94.8	123.0	110.0	100.0
7	73.6*	114.0	85.4*	98.0*	91.4*	108.0*	95.9*	104.0*
8	113.7	120.8	89.7	126.6	153.6	109.2	125.4	127.6
9	122.0	125.0	132.0	138.0	116.0	116.0	127.0	139.0
10	113.0	111.2	94.0*	112.8*	87.1*	97.6*	100.2*	98.5*
11	129.4	133.7	123.1	135.5	125.4	129.1	95.8	128.1
12	156.0*	142.0*	88.7	153.0	139.0	163.0	117.0	188.0
13	129.1	*	333.7*	127.1	158.8	164.6	112.5	108.1
14	122.0	113.3	166.7	125.7	129.1	144.7	116.8	112.0
15	38.6*	124.5	135.6	128.7	107.4	122.1	108.8	99.3

TABLE C-69

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR 1,1,2-TRICHLOROETHANE ANALYSIS BY WATER TYPE
HIGH YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	5	6	5	6	5	6	5	6
TRUE CONC:	480.0	432.0	480.0	432.0	480.0	432.0	480.0	432.0
LAB NUMBER								
1	512.0	445.0	468.0	446.0	537.0	422.0	513.0	495.0
2	556.9	729.4*	701.8*	506.1	598.0	671.7	615.6	700.1
3	493.5	396.8	468.9	441.2	478.0	417.7	449.7	191.0
4	446.9	403.9	408.3	407.7	440.8	232.8	431.0	508.0
5	535.0	370.0	436.0	453.0	417.0	506.0	623.0	331.0
6	475.0	257.0	392.0	398.0	418.0	316.0	387.8	350.0
7	165.0	230.0	194.0*	199.0*	278.0*	210.0*	193.0*	208.0*
8	470.6	382.1	331.3	439.1	391.2	447.2	477.7	418.1
9	354.0	456.0	467.0	339.0	334.0	331.0	327.0	382.0
10	353.4	334.2	332.3*	286.5*	284.3*	281.1*	338.3*	264.4*
11	534.0	534.0	538.0	569.0	565.0	453.0	558.0	453.0
12	565.0*	467.0*	548.0	622.0	557.0	463.0	542.0	487.0
13	252.6	305.5	418.4	360.1	337.6	312.0	319.0	265.1
14	474.8	304.5	421.6	350.1	263.5	459.8	401.9	301.1
15	508.1	272.3	475.5	489.1	439.1	397.1	359.1	331.7

TABLE C-70

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR 1,1,2,2-TETRACHLOROETHANE ANALYSIS BY WATER TYPE
LOW YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	1	2	1	2	1	2	1	2
TRUE CONC:	15.0	17.0	15.0	17.0	15.0	17.0	15.0	17.0
LAB NUMBER								
1	14.5	16.2	17.3	16.5	18.7	23.1	19.9	10.7
2	13.3	13.5	8.2	15.9	7.9	15.2	10.8	17.7
3	18.8	17.5	18.0	19.5	16.4	15.8	15.3	10.0
4	14.4	17.4	16.8	15.8	12.1	16.3	22.8	6.5
5	15.8	16.8	18.5	15.3	16.0	5.5	15.5	14.9
6	6.6	17.6	12.4	20.4	15.4	17.7	13.0	13.4
7	22.3	13.3	11.5	15.0	13.0	13.4	11.6	17.5
8	14.8	18.7	15.7	13.6	21.3	15.8	19.2	18.0
9	18.8	18.1	20.2	25.8*	17.8	16.1	17.7	20.5
10	13.9	27.6*	15.7	16.0	27.7	24.0	16.9	23.4
11	21.4	17.8	18.2	16.6	17.3	19.1	23.1	22.5
12	12.0	12.6	14.6	12.2	12.4*	14.2*	9.7	10.6
13	25.6	21.6	22.7*	29.9*	23.9	19.1	21.6	20.3
14	10.2*	8.1*	37.2*	11.9	12.5*	13.1*	7.4*	10.5*
15	145.1*	131.8*	11.7	97.8*	268.2*	44.1*	91.2*	1.7

TABLE C-71

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR 1,1,2,2-TETRACHLOROETHANE ANALYSIS BY WATER TYPE
MEDIUM YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	3	4	3	4	3	4	3	4
TRUE CONC:	162.0	170.0	162.0	170.0	162.0	170.0	162.0	170.0
LAB NUMBER								
1	216.0	203.0	135.8	180.0	196.0	253.0	176.0	148.0
2	129.1	131.6	96.7	149.2	122.3	136.5	137.8	149.1
3	196.1	203.0	192.0	220.9	189.7	220.5	129.2	52.3
4	173.7	161.2	157.2	144.7	153.7	150.9	79.4	266.7
5	169.0	161.0	158.0	194.0	177.1	174.0	132.0	172.0
6	163.0	89.1	138.0	147.0	163.5	152.0	144.0	135.0
7	107.0	170.0	111.0	123.0	124.0	148.0	131.0	137.0
8	167.4	176.8	140.1	174.7	211.5	163.7	177.0	187.3
9	176.0	179.0	248.0	204.0	174.0	182.0	196.0	210.0
10	164.5	183.2	153.9	199.3	145.9	156.9	188.2	163.2
11	170.7	142.6	184.2	180.6	132.3	137.3	110.5	130.4
12	144.0	149.0	89.3	114.0	104.0*	133.0*	111.0	208.0
13	171.6	*	518.1*	200.5*	229.0	193.7	149.2	156.6
14	106.7*	96.7*	151.6	116.0	116.5*	118.4*	85.4*	76.4*
15	112.1	30.3*	175.5	300.4*	235.9	212.3	44.0	230.7

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TABLE C-72

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR 1,1,2,2-TETRACHLOROETHANE ANALYSIS BY WATER TYPE
HIGH YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	5	6	5	6	5	6	5	6
TRUE CONC:	680.0	612.0	680.0	612.0	680.0	612.0	680.0	612.0
LAB NUMBER								
1	668.0	601.0	496.0	730.0	697.0	823.0	730.0	425.0
2	553.8	741.8	592.0	472.3	562.5	703.6	630.4	690.6
3	806.6	723.5	781.4	830.0	834.8	738.8	753.1	229.8
4	518.6	710.0	508.2	523.8	556.0	533.8	393.4	693.5
5	659.0	578.0	676.0	677.0	715.0	634.0	742.0	492.0
6	550.0	343.0	515.0	468.0	427.0	578.0	563.0	557.0
7	464.0	584.0	522.0	466.0	780.0	554.0	538.0	538.0
8	724.4	566.0	531.5	631.1	532.4	637.3	695.1	574.5
9	465.0	634.0	742.0	475.0	438.0	442.0	416.0	585.0
10	547.4	564.2	657.9	485.8	471.2	463.1	574.8	458.9
11	880.0	586.0	919.0	1239.0*	632.0	577.0	697.0	568.0
12	414.0	448.0	315.0	543.0	371.0*	351.0*	433.0	294.0
13	536.2	621.0	926.3*	888.7*	630.9	563.6	579.0	516.4
14	437.2*	302.4*	440.0	362.4	238.5*	431.4*	315.3*	323.2*
15	335.7	527.2	556.6	644.7	840.3	460.7	165.9	878.8

TABLE C-73

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR 1,2-DICHLOROBENZENE/1,4-DICHLO ANALYSIS BY WATER TYF
LOW YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	1	2	1	2	1	2	1	2
TRUE CONC:	16.0	16.3	16.0	16.3	16.0	16.3	16.0	16.3
LAB NUMBER								
1	21.6	22.9	31.1	22.6	21.3	24.5	28.6	22.4
2	10.6	12.6	6.6*	7.8*	3.9	20.5	5.0	8.4
3	19.4	19.4	17.8	20.0	18.6	19.5	14.5	29.1
4	19.5	17.7	19.0	17.0	13.9	25.3	17.2	17.5
5	19.4	17.4	20.8	18.0	17.0	17.8	20.4	17.2
6	*	*	*	*	*	*	*	*
7	21.0	13.8	10.6	13.2	10.8*	10.4*	12.0*	15.0*
8	15.0	24.0	20.6	28.7	24.9	19.4	15.4	13.4
9	19.2	19.3	17.3	25.5	21.2	16.2	17.0	18.2
10	*	*	*	*	*	*	*	*
11	*	*	*	*	*	*	*	*
12	24.4	24.6	33.2	23.2	23.7	25.7	16.3	20.8
13	33.7*	31.7	5.4*	0.6*	45.2	32.5	30.0	37.7
14	18.7	22.0	59.4*	13.0	35.2	25.0	43.0	28.5
15	77.0*	87.4*	16.9	74.8*	89.9*	35.5*	27.3	1.9

TABLE C-74

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR 1,2-DICHLOROBENZENE/1,4-DICHLO ANALYSIS BY WATER TYP
MEDIUM YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	3	4	3	4	3	4	3	4
TRUE CONC:	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0
LAB NUMBER								
1	254.1	135.1	145.8	220.0	214.1	113.1	214.9	225.0
2	53.3	164.1	37.7*	171.8*	142.5	128.0	25.3	141.6
3	193.7	250.5	236.8	223.6	283.2	233.9	363.8	275.1
4	210.1	217.6	198.8	167.3	271.2	183.5	177.0	203.8
5	226.0	186.8	189.6	236.0	225.4	230.0	177.0	212.0
6	*	*	*	*	*	*	*	*
7	84.5	122.4	84.6	92.8	81.2*	91.0*	112.2*	89.4*
8	215.4	212.4	266.7	191.2	297.1	181.4	204.3	175.5
9	203.3	197.5	310.0	201.1	220.0	182.2	231.0	212.0
10	*	*	*	*	*	*	*	*
11	*	*	*	*	*	*	*	*
12	309.0	306.0	160.0	278.0	265.0	295.0	226.0	460.0*
13	160.2	*	166.7*	34.1*	413.3	176.3	232.0	193.7
14	168.2	92.6	201.8	63.4	13.4	164.5	167.9	310.0
15	315.5*	220.7*	301.3	216.0	634.0*	272.1*	108.0	154.3

TABLE C-75

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR 1,2-DICHLOROBENZENE/1,4-DICHLO ANALYSIS BY WATER TYP
HIGH YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	5	6	5	6	5	6	5	6
TRUE CONC:	778.0	780.0	778.0	780.0	778.0	780.0	778.0	780.0
LAB NUMBER								
1	809.1	844.1	552.0	942.0	743.1	383.1	956.9	793.0
2	972.7	665.7	519.8*	0.0*	801.3	356.5	805.2	576.7
3	968.6	755.9	870.9	946.3	1031.5	926.0	610.7	845.1
4	553.7	700.6	629.8	612.0	723.7	674.7	495.5	565.4
5	918.0	730.0	782.0	944.0	820.0	836.0	930.0	614.0
6	*	*	*	*	*	*	*	*
7	406.0	448.0	434.0	351.0	530.0*	444.0*	541.0*	420.0*
8	771.0	572.0	951.3	498.1	774.1	659.9	600.6	563.5
9	657.0	973.0	1335.0	668.0	493.0	686.0	603.0	925.0
10	*	*	*	*	*	*	*	*
11	*	*	*	*	*	*	*	*
12	836.0	965.0	783.0	1380.0	926.0	790.0	697.0	798.0
13	971.9	636.6	313.8*	309.4*	934.8	830.2	1144.5	734.3
14	735.6	614.2	350.6	653.0	583.1	559.9	593.2	1025.8
15	1052.0*	1109.9*	522.0	1258.6	1343.9*	790.3*	409.8	618.4

TABLE C-76

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR 1,2-DICHLOROETHANE ANALYSIS BY WATER TYPE
LOW YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	1	2	1	2	1	2	1	2
TRUE CONC:	9.9	11.0	9.9	11.0	9.9	11.0	9.9	11.0
LAB NUMBER								
1	0.0*	7.4	6.9	3.8*	7.9	5.8	7.4	8.1
2	0.0*	13.1	0.0*	13.0	4.8	0.0*	3.7	0.0*
3	10.0	11.6	9.9	11.5	10.6	11.3	10.3	16.4
4	11.7	10.7	10.4	10.8	9.7	15.2	12.5	16.7
5	10.8	10.0	5.3*	10.7*	8.9*	4.0*	9.2	10.9
6	10.1	12.8	9.2	14.3	9.1	11.2	9.2	9.4
7	11.2	7.1	6.0	11.9	9.6	9.3	8.4	9.2
8	10.9	12.2	10.6	9.9	10.9	11.3	13.3	12.6
9	12.6	13.0	13.5	11.8	11.2	13.7	11.4	15.0
10	5.6*	10.4	9.9	10.1	9.9	9.3	9.3	8.5
11	8.9	10.7	8.6	8.9	9.3	10.6	9.5	9.3
12	9.6	10.6	8.9	10.4	9.5	10.6	13.0	10.6
13	13.2	17.8	12.4	27.2*	19.1	16.2	0.8	10.9
14	10.9	11.0	37.3*	11.9	14.8	13.2	10.7	12.0
15	25.1*	27.4*	11.7	13.9	23.1	12.3	5.9*	10.0*

TABLE C-77

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR 1,2-DICHLOROETHANE ANALYSIS BY WATER TYPE
MEDIUM YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	3	4	3	4	3	4	3	4
TRUE CONC:	104.0	110.0	104.0	110.0	104.0	110.0	104.0	110.0
LAB NUMBER								
1	147.0	76.8	151.9	79.7	109.0	116.0	94.3	76.3
2	112.4	79.9	131.2	100.4	134.6	78.4	117.2	61.5
3	105.1	78.2	118.2	69.0	114.4	104.8	186.4*	280.7*
4	93.9	97.5	107.3	64.9	163.0	103.0	131.2	124.7
5	120.0	59.1	95.6*	45.6*	42.4*	83.8*	103.0	76.9
6	84.2	89.4	109.0	99.9	91.8	70.9	99.5	60.4
7	82.0	122.0	86.1	102.0	101.0	94.4	116.0	96.9
8	113.3	81.1	103.5	94.8	121.0	90.3	112.1	132.9
9	124.0	132.0	122.0	140.0	109.0	137.0	141.0	148.0
10	128.7	114.2	110.1	131.3	105.7	112.0	121.0	112.2
11	123.2	105.6	111.2	102.6	120.1	111.9	87.1	112.8
12	141.0	93.8	91.3	116.0	118.0	115.0	96.4	107.0
13	124.5	*	338.9*	105.2	160.6	140.9	101.8	96.6
14	116.3	67.6	164.0	73.3	125.9	116.9	119.1	77.5
15	139.1	159.5	151.1	113.7	11.2*	111.5	94.2*	55.1*

TABLE C-78

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR 1,2-DICHLOROETHANE ANALYSIS BY WATER TYPE
HIGH YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	5	6	5	6	5	6	5	6
TRUE CONC:	440.0	396.0	440.0	396.0	440.0	396.0	440.0	396.0
LAB NUMBER								
1	456.0	360.0	453.0	335.0	418.0	442.0	396.0	365.0
2	685.2	530.0	675.0*	540.2	718.2*	537.0	754.3*	490.3
3	456.6	392.8	445.1	438.8	467.2	436.2	459.9	1272.6*
4	476.6	413.6	433.7	374.0	323.3	289.8	497.6	560.1
5	479.0	306.0	409.0*	230.0*	182.0*	390.0*	442.0	328.0
6	475.0	417.0	480.0	584.0	367.0	231.0	322.2	431.0
7	295.0	380.0	426.0	314.0	474.0	393.0	424.0	350.0
8	427.4	401.4	405.4	462.7	393.1	431.5	497.9	454.8
9	438.0	478.0	471.0	408.0	448.0	371.0	413.0	511.0
10	511.4	435.4	527.4	405.3	484.6	401.9	467.2	442.3
11	547.0	483.0	549.0	518.0	521.0	439.0	514.0	428.0
12	444.0	436.0	523.0	432.0	449.0	419.0	528.0	469.0
13	246.9	313.5	509.1	369.9	318.7	336.5	312.4	266.2
14	556.1	440.5	458.2	482.4	334.3	554.9	447.7	352.0
15	539.2	326.1	390.1	481.4	363.6	318.2	344.4*	118.4*

TABLE C-79

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR 1,2-DICHLOROPROPANE ANALYSIS BY WATER TYPE
LOW YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	1	2	1	2	1	2	1	2
TRUE CONC:	13.5	15.0	13.5	15.0	13.5	15.0	13.5	15.0
LAB NUMBER								
1	16.0	18.2	17.2	19.0	18.3	20.0	17.2	17.1
2	0.0*	32.3*	0.0*	15.5	0.0*	0.0*	0.0*	0.0*
3	17.4	18.3	17.0	18.9	16.0	18.4	13.4	36.5*
4	18.0	17.5	13.8	21.3	25.1	19.2	31.4*	19.2
5	17.5	15.8	17.9	17.5	18.6	18.9	6.9	14.6
6	14.1	18.4	15.6	18.6	18.3	17.6	15.0	17.5
7	14.7*	10.5*	9.4*	16.2*	13.5*	14.8*	11.7*	14.2*
8	17.2	20.9	17.4	15.6	20.5	14.8	23.3	20.2
9	20.3	21.4	19.8	20.7	18.3	19.9	18.8	22.3
10	12.7	17.5	15.0	15.4	15.0	14.9	13.8	14.5
11	17.4	19.1	17.4	15.8	17.8	19.5	17.9	17.6
12	26.0*	92.0*	22.0	24.0	19.0	34.0*	12.0	25.0
13	19.1	26.8	19.6	35.6*	28.3	23.6	16.5	18.0
14	17.6	20.1	69.6*	20.0	21.8	22.3	15.4	18.4
15	22.7	24.9	22.4	13.9	20.0	20.4	17.4	18.5

TABLE C-80

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR 1,2-DICHLOROPROPANE ANALYSIS BY WATER TYPE
MEDIUM YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	3	4	3	4	3	4	3	4
TRUE CONC:	142.0	150.0	142.0	150.0	142.0	150.0	142.0	150.0
LAB NUMBER								
1	211.0	180.0	223.4	188.0	203.0	222.0	181.0	209.0
2	262.1	310.1*	129.6	370.4*	307.1*	308.5*	351.1*	346.6
3	177.6	189.1	184.1	185.4	180.2	185.8	181.1	191.3
4	255.9	182.2	155.7	168.8	219.2	243.1	65.1*	312.5
5	228.0	170.0	161.0	157.0	167.3	223.0	168.6	220.6
6	169.0	143.0	154.0	167.0	145.4	181.0	158.0	141.0
7	110.0*	150.0*	128.0*	140.0*	130.0*	144.0*	147.0*	144.0*
8	182.8	175.6	145.9	192.8	230.2	173.6	194.7	213.2
9	203.0	221.0	191.0	220.0	195.0	183.0	201.0	225.0
10	181.7	166.7	157.0	181.9	145.6	175.2	174.6	173.6
11	200.1	199.5	191.2	202.1	186.8	193.1	140.3	192.0
12	245.0*	286.0*	234.0	219.0	209.0	250.0	258.0*	277.0
13	175.6	*	466.6*	178.0	225.0	216.0	169.7	169.3
14	195.7	185.6	270.9	175.8	201.5	218.3	178.8	172.4
15	86.2*	186.2	195.6	185.9	150.0	169.5	187.8	215.2

TABLE C-81

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR 1,2-DICHLOROPROPANE ANALYSIS BY WATER TYPE
HIGH YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	5	6	5	6	5	6	5	6
TRUE CONC:	600.0	540.0	600.0	540.0	600.0	540.0	600.0	540.0
LAB NUMBER								
1	822.0	579.0	719.0	612.0	779.0	659.0	731.0	713.0
2	1574.5*	1576.0*	1140.5*	1415.1*	1903.2*	1645.4*	1772.0*	1285.7*
3	650.3	582.3	642.3	612.6	626.5	593.8	605.0	652.3
4	555.9	528.7	582.3	568.6	614.6	349.4	587.5	777.2
5	808.0	551.0	656.0	660.0	678.0	797.0	908.6	491.6
6	679.0	414.0	542.0	542.0	473.0	540.0	527.1	524.0
7	269.0*	349.0*	340.0*	333.0*	462.0*	362.0*	368.0*	351.0*
8	655.9	635.2	534.1	635.6	672.9	739.5	667.1	728.4
9	576.0	692.0	575.0	596.0	525.0	500.0	557.0	635.0
10	745.6	574.2	631.3	568.7	613.7	555.0	628.2	559.9
11	866.0	749.0	837.0*	769.0	781.0	681.0	782.0	675.0
12	764.0*	596.0*	604.0	683.0	557.0	624.0	107.0*	560.0
13	375.7	445.5	675.0	580.4	482.9	476.0	544.9	430.2
14	706.0	457.9	605.2	530.2	399.8	682.4	580.8	429.0
15	604.3	319.9	569.0	588.8	573.8	699.2	605.0	781.3

TABLE C-82

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR 1,3-DICHLOROBENZENE ANALYSIS BY WATER TYPE
LOW YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	1	2	1	2	1	2	1	2
TRUE CONC:	8.0	7.2	8.0	7.2	8.0	7.2	8.0	7.2
LAB NUMBER								
1	10.6	10.5	14.6	9.5	10.7	11.3	14.0	10.6
2	9.6	17.3*	4.9	17.6	5.3	11.9	11.3	6.4
3	9.9	7.8	8.4	8.5	9.4	8.0	6.8	11.9
4	10.0	7.7	9.4	7.9	6.6	10.3	7.8	8.0
5	7.9*	9.2	9.4	7.2	8.6	7.7	7.4	6.6
6	*	*	*	*	*	*	*	*
7	9.8*	5.2*	4.0*	6.6*	5.3*	4.7*	3.1*	6.1*
8	9.7	10.6	12.0	29.1	27.4*	12.0	10.0	7.5
9	9.6	9.7	9.0	10.3	10.4	7.2	8.9	7.9
10	*	*	*	*	*	*	*	*
11	*	*	*	*	*	*	*	*
12	10.0	8.1	11.9	7.4	8.8	9.0	6.3	7.1
13	0.0*	12.5	4.9*	5.3*	14.0	6.5	13.0	4.2
14	10.3	9.7	33.5*	3.8	19.0	13.9	21.6	12.8
15	37.3*	30.2*	12.1	24.3	38.7*	14.1	17.9	5.9

TABLE C-83

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR 1,3-DICHLOROBENZENE ANALYSIS BY WATER TYPE
MEDIUM YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	3	4	3	4	3	4	3	4
TRUE CONC:	120.0	114.0	120.0	114.0	120.0	114.0	120.0	114.0
LAB NUMBER								
1	155.1	135.1	90.3	123.0	131.7	134.7	127.4	131.0
2	138.6	150.0	108.0	157.3	156.7	139.7	145.3	158.9
3	120.2	131.3	139.0	124.7	136.6	138.6	198.1*	108.1
4	112.2	124.5	121.0	93.1	159.5	106.1	123.8	108.4
5	118.0	103.0	110.0	126.0	128.2	113.0	116.0	106.0
6	*	*	*	*	*	*	*	*
7	46.3*	50.0*	43.3*	55.2*	54.4*	45.3*	60.6*	43.8*
8	134.3	130.8	117.3	113.8	166.2	113.5	94.0	125.3
9	119.0	114.0	174.0	114.0	128.0	104.0	135.0	112.0
10	*	*	*	*	*	*	*	*
11	*	*	*	*	*	*	*	*
12	185.0*	163.0	88.8	156.0	147.0	156.0	128.0	258.0*
13	129.5	*	115.7*	39.3*	174.1	120.8	131.0	125.1
14	126.2	64.2	163.0	42.1	123.0	115.2	127.0	200.8*
15	205.7*	125.3*	161.5	167.5	149.7	161.5	114.5	134.9

TABLE C-84

ENVIRONMENTAL MONITORING AND SUPPORT LAPORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL PROTECTION AGENCY

** EPA METHOD 624 VALIDATION STUDY - PURGEABLES **

RAW DATA FOR 1,3-DICHLOROBENZENE ANALYSIS BY WATER TYPE
HIGH YOUDEN PAIR, UNITS - UG/L

	DISTILLED WATER		TAP WATER		SURFACE WATER		INDUSTRIAL EFFLUENT	
AMPUL NO:	5	6	5	6	5	6	5	6
TRUE CONC:	432.0	480.0	432.0	480.0	432.0	480.0	432.0	480.0
LAB NUMBER								
1	455.1	493.1	313.0	610.0	421.7	575.7	503.4	508.0
2	684.0	695.1	430.3	682.3	688.2	698.0*	655.5*	701.5
3	538.8	481.1	468.0	563.2	549.7	575.6	337.1	465.7
4	296.7	470.4	311.6	370.4	402.0	447.3	350.2	326.0
5	449.0	456.0	419.0	579.0	463.0	469.0	473.0	377.0
6	*	*	*	*	*	*	*	*
7	108.0*	259.0*	211.0*	255.0*	319.0*	323.0*	167.0*	230.0*
8	387.5	441.7	399.8	415.0	478.8	498.6	393.1	447.1
9	358.0	610.0	720.0*	414.0	274.0	418.0	327.0	555.0
10	*	*	*	*	*	*	*	*
11	*	*	*	*	*	*	*	*
12	427.0	565.0	420.0	759.0	492.0	468.0	378.0	477.0
13	393.5	516.4	202.4*	257.5*	331.3	518.2	457.2	475.9
14	521.4	531.3	259.2	510.0	454.0	475.8	423.9	826.7
15	575.2*	754.5*	420.0	699.6	747.8	473.1	405.5	535.9

TABLE C-85. BLANK VALUES FOR VALIDATION ANALYSES - TAP WATER

COMPOUND	LABORATORY 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
BENZENE	0	3.3	0.8 0.9*	0	1.2	0	0	0	0	0	0	0	0 1.6*	4.7	0
BROMODICHLOROMETHANE	14.2 23.3*	0	0	6.8	18.3	0	1.4	0	0	1.2	38.8	27.0	0 1.7*	66.3	11.4
BROMOFORM	0 1.3*	0	0	0	0	0	0	0	5.8	0	3.8	0	0 2.2*	0	0
BROMOMETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CARBON TETRACHLORIDE	0	0	0	0	0	0	0	0	0	0	0	0	0 1.1*	0	0
CHLOROBENZENE	0	0	0	0	0	0	0	0	0	0	0	0	0 3.3*	1.6	0
CHLOROETHANE	0	3.9	0	0	0	0	0	0	0	0	0	0	0.5 0 *	0	0
CHLOROFORM	24.1 36.5*	0	0.1	24.0	63.7	0	31.4	0	0	17.0	47.7	24.9	0 1.5*	49.2	128
CHLOROMETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CIS-1,3-DICHLOROPROPENE	0	0	0	0	0	0	0	0	0	0	0	0	0.5 0 *	0	0
DIBROMOCHLOROMETHANE	12.4 14.3*	0	0	0.7	3.4	0	0	0	0	0	31.7	0	0 1.6*	29.7	1.2
ETHYL BENZENE	0	0	0	0	0	0	0	0	0	0	0	0	0 3.5*	0	0
METHYLENE CHLORIDE	0.6 1.5*	0	5.7 5.6*	25.8	3.6	0	20.6	43.4	13.9	1.3	0	1.6	151 20.5*	0.5	20.6
TETRACHLOROETHENE	0 1.0*	0	0.3 0.6*	0	0	0	0	0	0	0	0	0	0 2.9*	2.0	0
TOLUENE	0 0.1*	0	0.4 0.2*	2.6	0	0	3.0	0	0	0	0	0	0 2.7*	0	0
TRANS-1,2-DICHLOROETHENE	0	0	0	0	0	0	0	0	0	0	0	0	0 1.3*	0	0
TRANS-1,3-DICHLOROPROPENE	0	0	0	0	0	0	0	0	0	0	0	0	0 1.4*	0	0

TABLE C-85. (Continued)

COMPOUND	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	LABORATORY														
TRICHLOROETHENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TRICHLOROFLUOROMETHANE	0	0	0	0.6	0	0	0	0	0	0	0	0	2.3* 0	0	0
1,1-DICHLOROETHANE	0	0	0.1	0	0	0	0	0	0	0	0	0	1.9* 0.5	0	0
1,1-DICHLOROETHENE	0	0	0	0	0	0	0	0	0	0	0	0	1.2* 0	0	0
1,1,1-TRICHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	1.5* 0	0	0
1,1,2-TRICHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	1.8* 0.5	0	0
1,1,2,2-TETRACHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	2.7* 0	0	0
1,2-DICHLOROBENZENE/1,4-DICHLO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,2-DICHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,2-DICHLOROPROPANE	0	0	0	0	0	0	0	0	0	0	0	0	1.3* 1.4	0	0
1,3-DICHLOROBENZENE	0	0	0	0	0	0	0	0	0	0	0	0	2.2* 0	3.2	0
2-CHLORETHYLVINYL ETHER	0 1.1*	0	6.6 6.0*	0	0	0	0	0	2.3	0	0	0	0	0	0

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* LABS 1 AND 13 VALUES ARE FOR AMPULES 1, 4 AND 6. LAB 3 VALUES ARE FOR AMPULES 2, 3 AND 5.

TABLE C-86. BLANK VALUES FOR VALIDATION ANALYSES - SURFACE WATER

COMPOUND	LABORATORY 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
BENZENE	0	0	1.1 1.1*	0	1.0	1.7	0	0	0	0	0	0	0.2 0 *	0	3.5
BROMODICHLOROMETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BROMOFORM	0	0	0	0	0	0	0	0	0	0	0	0	0.1 0 *	0	0
BROMOMETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CARBON TETRACHLORIDE	0	0	0.1 0.1*	0	0	0	0	0	0	0	0	0	0	0	0
CHLOROBENZENE	0	0	0	0	0	0	0.3	0	0	0	0	0	0.3 0 *	0	0.7
CHLOROETHANE	0	0	0	0	0	3.4	0	0	0	0	0	0	0.3 0 *	0	0
CHLOROFORM	1.0	0	0 0.1*	2.7	1.3	0.2	4.3	0	0	1.2	0	0	0	0	17.8
CHLOROMETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0.4 0.3*	0	0
CIS-1,3-DICHLOROPROPENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DIBROMOCHLOROMETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ETHYL BENZENE	0	0	0	0	0	0	1.1	0	0	0	0	0	0.6 0 *	0	0.6
METHYLENE CHLORIDE	2.7	10.7	1.9 5.2*	80.7	11.1	17.4	6.4	0	12.0	58.1	0	112	15.2 26.3*	355	2941
TETRACHLOROETHENE	0	0	0.2 0.5*	0	0	0	1.4	0	0	0	0	0	0.3 0 *	0	0
TOLUENE	0	0	0.2 0.3*	2.4	0	0.9	3.3	0	0	0	0	0	0 0.7*	0	1.2
TRANS-1,2-DICHLOROETHENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TRANS-1,3-DICHLOROPROPENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TRICHLOROETHENE	0	0	0	0	0	0.5	0	0	0	0	0	0	0.1 0 *	0	2.6
TRICHLOROFLUOROMETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0.1 0 *	0	0

TABLE C-86. (Continued)

COMPOUND	LABORATORY 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1,1-DICHLORCETHANE	0	0	0.2 0.1*	0	0	0	0	0	0	0	0	0	0	0	0
1,1-DICHLOROETHENE	0	0	0	0	0	0	0	0	0	0	0	0	0.1 0 *	0	0
1,1,1-TRICHLCROETHANE	0	0	0	1.1	0	0	0	0	0	0	0	0	0	0	0
1,1,2-TRICHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,1,2,2-TETRACHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,2-DICHLORCBENZENE/1,4-DICHLO	1.9	0	0	0	0	0	0	0	0	0	0	0	2.3 0 *	0	0
1,2-DICHLORCETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,2-DICHLOROPROPANE	0	0	0	0	0	0	0	0	0	0	0	0	0.1 0 *	0	0
1,3-DICHLORCBENZENE	0.3	0	0	0	0	0	0	0	0	0	0	0	1.4 0 *	0	0
2-CHLORETHYLVINYL ETHER	0	0	7.7 6.7*	0	0	0	0	0	2.7	0	0	0	0	0	0

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* LAB 3 VALUES ARE FOR AMPULES 2, 3 AND 5. LAB 13 VALUES ARE FOR AMPULES 1, 3 AND 6.

TABLE C-87. BLANK VALUES FOR VALIDATION ANALYSES - INDUSTRIAL EFFLUENT

COMPOUND	LABORATORY 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
BENZENE	0.7 0.3*	0	1.1 3.2*	0.6	25.2	1.2	0	0	0	0	0	0	0	0	0.2
BROMODICHLOROMETHANE	0	0	0 0.3*	4.1	0	0	0	0	0	0	0	0	0	3.1	3.0
BROMOFORM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BROMOMETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CARBON TETRACHLORIDE	0	0	0 3.8*	0	0	0	0	0	0	0	0	0	0	0	0
CHLOROBENZENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9
CHLOROETHANE	0	0	0 0.0*	0	0	0	0	0	0	0	0	0	0	0	0
CHLOROFORM	1.4 1.3*	1.2	0 2.4*	7.7	28.4	20.4	0	0	0	7.0	0	0	0	12.4	46.5
CHLOROMETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CIS-1,3-DICHLOROPROPENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DIBROMOCHLOROMETHANE	0	0	0	0.8	0	0	0	0	0	0	0	0	0	0.5	0
ETHYL BENZENE	0.2 0 *	0	0 0.1*	0	43.4	0	0	0	0	0	0	0	0	0	1.2
METHYLENE CHLORIDE	16.1 10.0*	53.3	0 9.8*	84.7	2728	5.1	3.5	10.1	13.5	55.8	0	53.6	1.1	29.5	10.1
TETRACHLOROETHENE	0.6	1.9	0 1.7*	0	116	0	0	2.1	0	3.2	0	0	0	0.3	3.6
TOLUENE	0.8 0.4*	0	0.1 6.1*	2.4	22.2	0.6	1.0	0	0.9	0	0	0	0	0.5	0.8
TRANS-1,2-DICHLOROETHENE	0	0	0	23.0	0	0	0	0	0	0	0	0	0	0	0.9
TRANS-1,3-DICHLOROPROPENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TRICHLOROETHENE	0	0	0 0.2*	41.7	23.8	0	0	0	0	0	0	0	0	0	9.8
TRICHLOROFLUOROMETHANE	0.1 0 *	8.0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,1-DICHLOROETHANE	0	0	0.1 2.0*	0	0	0	0	0	0	0	0	0	0	0	4.2

TABLE C-87. (Continued)

COMPOUND	LABORATORY 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1,1-DICHLORCETHENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,1,1-TRICHLCROETHANE	0	4.4	1.7 16.8*	0	82.6	0	8.7	2.0	0	0	0	0	0	0	30.9
1,1,2-TRICHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,1,2,2-TETRACHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.1
1,2-DICHLOROBENZENE/1,4-DICHLO	0 2.1*	0	0	0	0	0	0	8.0	0	0	0	0	0	0	10.0
1,2-DICHLORCETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,2-DICHLORCPROPANE	0	0	0	0	8.4	0	0	0	0	0	0	0	0	0	0
1,3-DICHLOROBENZENE	0 0.6*	0	0	0	0	0	0	3.6	0	0	0	0	0	0	1.7
2-CHLORETHYLVINYL ETHER	0	0	8.2 6.9*	0	0	0	0	0	4.1	0	0	0	0	0	0

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* LAB 1 VALUES ARE FOR AMPULES 1, 3 AND 5. LAB 3 VALUES ARE FOR AMPULES 1, 4 AND 5.

APPENDIX D

EPA METHOD 624 - PURGEABLES

United States
Environmental Protection
Agency

Environmental Monitoring and
Support Laboratory
Cincinnati OH 45268

Research and Development

EPA

Test Method

Purgeables — Method 624

1. Scope and Application

1.1 This method covers the determination of a number of purgeable organics. The following parameters may be determined by this method:

Parameter	STORET No.	CAS No.
Benzene	34030	71-43-2
Bromodichloromethane	32101	75-27-4
Bromoform	32104	75-25-2
Bromomethane	34413	74-83-9
Carbon tetrachloride	32102	56-23-5
Chlorobenzene	34301	108-90-7
Chloroethane	34311	75-00-3
2-Chloroethylvinyl ether	34576	110-75-8
Chloroform	32106	67-66-3
Chloromethane	34418	74-87-3
Dibromochloromethane	32105	124-48-1
1,2-Dichlorobenzene	34536	95-50-1
1,3-Dichlorobenzene	34566	541-73-1
1,4-Dichlorobenzene	34571	106-46-7
1,1-Dichloroethane	34496	75-34-3
1,2-Dichloroethane	34531	107-06-2
1,1-Dichloroethene	34501	75-35-4
trans-1,2-Dichloroethene	34546	156-60-5
1,2-Dichloropropane	34541	78-87-5
cis-1,3-Dichloropropene	34704	10061-01-5
trans-1,3-Dichloropropene	34699	10061-02-6
Ethyl benzene	34371	100-41-4
Methylene chloride	34423	75-09-2
1,1,2,2-Tetrachloroethane	34516	79-34-5
Tetrachloroethene	34475	127-18-4
Toluene	34010	108-88-3
1,1,1-Trichloroethane	34506	71-55-6
1,1,2-Trichloroethane	34511	79-00-5
Trichloroethene	39180	79-01-6
Trichlorofluoromethane	34488	75-69-4
Vinyl chloride	39175	75-01-4

1.2 The method may be extended to screen samples for acrolein (STORET No. 34210, CAS No. 107-02-8) and acrylonitrile (STORET 34215, CAS No. 107-13-1), however, the preferred method for these two compounds is method 603.

1.3 This is a purge and trap gas chromatographic/mass spectrometer

(GC/MS) method applicable to the determination of the compounds listed above in municipal and industrial discharges as provided under 40 CFR 136.1.

1.4 The method detection limit (MDL, defined in Section 14.1)[1] for each parameter is listed in Table 1. The MDL for a specific wastewater differ from those listed, depending upon the nature of interferences in the sample matrix.

1.5 Until the U.S. Environmental Protection Agency establishes performance criteria based upon the results of interlaboratory testing, any alternative GC/MS method which meets the performance criteria described in Section 8.2 will be permitted. Performance must be verified for such modification by analyzing wastewater as described in Section 8.2.2. In addition, the laboratory must successfully participate in the applicable performance evaluation studies.

1.6 This method is restricted to use by or under the supervision of analysts experienced in the use of purge and trap systems and gas chromatograph/mass spectrometers and skilled in the interpretation of mass spectra. Each analyst must demonstrate the ability to generate acceptable results with this method using the procedure described in Section 8.2.

2. Summary of Method

2.1 An inert gas is bubbled through a 5-mL sample contained in a specially-designed purging chamber at ambient temperature. The purgeables are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is completed, the sorbent column is heated and backflushed with the inert gas to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeables which are then detected with a mass spectrometer[2,3].

3. Interferences

3.1 Impurities in the purge gas, organic compounds out-gassing from the plumbing ahead of the trap and solvent vapors in the laboratory account for the majority of contamination problems. The analytical system must be demonstrated to be free from contamination under the conditions of the analysis by running laboratory reagent blanks as described in Section 8.5. The use of non-TFE plastic tubing, non-TFE thread sealants, or flow controllers with rubber components in the purging device should be avoided.

3.2 Samples can be contaminated by diffusion of volatile organics (particularly fluorocarbons and methylene chloride) through the septum seal into the sample during shipment and storage. A field reagent blank prepared from reagent water and carried through the sampling and handling protocol can serve as a check on such contamination.

3.3 Contamination by carry over can occur whenever high level and low level samples are sequentially analyzed. To reduce carry over, the purging device and sample syringe must be rinsed with reagent water between sample analyses. Whenever an unusually concentrated sample is encountered, it should be followed by an analysis of reagent water to check for cross contamination. For samples containing large amounts of water-soluble materials, suspended solids, high boiling compounds or high purgeable levels, it may be necessary to wash out the purging device with a detergent solution, rinse it with distilled water, and then dry it in a 105 °C oven between analyses. The trap and other parts of the system are also subject to contamination; therefore, frequent bakeout and purging of the entire system may be required.

4. Safety

4.1 The toxicity or carcinogenicity of each reagent used in this method has not been precisely defined; however, each chemical compound should be treated as a potential health hazard. From this viewpoint, exposure to these chemicals must be reduced to the lowest possible level by whatever means available. The laboratory is responsible for maintaining a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method. A reference file of material data handling sheets should also be made available to all personnel involved in the chemical analysis. Additional references to laboratory safety are available and have been identified[5-7] for the information of the analyst.

4.2 The following parameters covered by this method have been tentatively classified as known or suspected, human or mammalian carcinogens: benzene, carbon tetrachloride, chloroform, 1,4-dichlorobenzene, and vinyl chloride. Primary standards of these toxic compounds should be prepared in a hood. A NIOSH/MESA approved toxic gas respirator should be worn when the analyst handles high concentrations of these toxic compounds.

5. Apparatus and Materials

5.1 Sampling equipment, for discrete sampling.

5.1.1 Vial—25-mL capacity or larger, equipped with a screw cap with hole in center (Pierce #13075 or equivalent). Detergent wash, rinse with tap and distilled water, and dry at 105 °C before use.

5.1.2 Septum—Teflon-faced silicone (Pierce #12722 or equivalent). Detergent wash, rinse with tap and distilled water, and dry at 105 °C for one hour before use.

5.2 Purge and trap device—The purge and trap device consists of three separate pieces of equipment: the sample purger, trap, and the desorber. Several complete devices are now commercially available.

5.2.1 The sample purger must be designed to accept 5-mL samples with a water column at least 3 cm deep. The gaseous head space between the water column and the trap must have a total volume of less than 15-mL. The purge gas must pass through the water column as finely divided bubbles with a diameter of less than 3 mm at the origin. The purge gas must be introduced no more than 5 mm from the base of the water column. The sample purger, illustrated in Figure 1, meets these design criteria.

5.2.2 The trap must be at least 25 cm long and have an inside diameter of at least 0.105 inch. The trap must be packed to contain the following minimum lengths of adsorbents: 1.0 cm of methyl silicone coated packing (Section 6.3.2), 15 cm of 2,6-diphenylene oxide polymer (Section 6.3.1), and 8 cm of silica gel, (Section 6.3.3). The minimum specifications for the trap are illustrated in Figure 2.

5.2.3 The desorber should be capable of rapidly heating the trap to 180 °C. The polymer section of the trap should not be heated higher than 180 °C and the remaining sections should not exceed 220 °C. The desorber design, illustrated in Figure 2, meets these criteria.

5.2.4 The purge and trap device may be assembled as a separate unit or be coupled to a gas chromatograph as illustrated in Figures 3 and 4.

5.3 GC/MS system.

5.3.1 Gas chromatograph—An analytical system complete with a temperature programmable gas chromatograph suitable for on-column injection and all required accessories including syringes, analytical columns, and gases.

5.3.2 Column—6 ft long × 0.1 in ID stainless steel or glass, packed with 1% SP-1000 on Carbopack B (60/80 mesh) or equivalent. This column was used to develop the method performance statements in Section 14. Guidelines for the use of alternate column packings are provided in Section 11.1.

5.3.3 Mass spectrometer—Capable of scanning from 20 to 260 amu every seven seconds or less, utilizing 70 volts (nominal) electron energy in the electron impact ionization mode and producing a mass spectrum which meets all the criteria in Table 2 when 50 ng of 4-bromofluorobenzene (BFB) is injected through the gas chromatograph inlet.

5.3.4 GC/MS interface—Any gas chromatograph to mass spectrometer interface that gives acceptable calibration points at 50 ng or less per injection for each of the parameters of interest and achieves all acceptable performance criteria (see Section 10) may be used. Gas chromatograph to mass spectrometer interfaces constructed of all-glass or glass-lined materials are recommended. Glass can be deactivated by silanizing with dichloro-dimethylsilane.

5.3.5 Data system—A computer system must be interfaced to the mass spectrometer that allows the continuous acquisition and storage on machine readable media of all mass spectra obtained throughout the duration of the chromatographic program. The computer must have software that allows searching any GC/MS data file for ions of a specified mass and plotting such ion abundances versus time or scan number. This type of plot is defined as an Extracted Ion Current Profile (EICP). Software must also be available that allows integrating the abundance in any EICP between specified time or scan number limits.

5.4 Syringes—5-mL glass hypodermic with Luerlok tip (two each), if applicable to the purging device.

5.5 Micro syringes—25-mL, 0.006 Inch ID needle.

5.6 Syringe valve—two-way, with Luer ends (three each), if applicable to the purging device.

5.7 Syringe—5-mL, gas-tight with shut-off valve.

5.8 Bottle—15-mL, screw-cap, with Teflon cap liner.

5.9 Balance—Analytical, capable of accurately weighing 0.0001 g.

6. Reagents

6.1 Reagent water—Reagent water is defined as a water in which an interferent is not observed at the MDL of the parameters of interest.

6.1.1 Reagent water may be generated by passing tap water through a carbon filter bed containing about 453 g of activated carbon (Calgon Corp., Filtrasorb-300 or equivalent).

6.1.2 A water purification system (Millipore Super-Q or equivalent) may be used to generate reagent water.

6.1.3 Reagent water may also be prepared by boiling water for 15 minutes. Subsequently, while maintaining the temperature at 90 °C, bubble a contaminant-free inert gas througn the water for one hour. While still hot, transfer the water to a narrow-mouth screw-cap bottle and seal with a Teflon-lined septum and cap.

6.2 Sodium thiosulfate—(ACS) Granular.

6.3 Trap materials

6.3.1 2,6-Diphenylene oxide polymer—Tenax (60/80 mesh), chromatographic grade or equivalent.

6.3.2 Methyl silicone packing—3% OV-1 on Chromosorb-W (60/80 mesh) or equivalent.

6.3.3 Silica gel, Davison Chemical, (35/60 mesh), grade-15 or equivalent.

6.4 Methanol—Pesticide quality or equivalent.

6.5 Stock standard solutions—Stock standard solutions may be prepared from pure standard materials or purchased as certified solutions. Prepare stock standard solutions in methanol using assayed liquids or gases as appropriate. Because of the toxicity of some of the organohalides, primary dilutions of these materials should be prepared in a hood. A NIOSH/MESA approved toxic gas respirator should be used when the analyst handles high concentrations of such materials.

6.5.1 Place about 9.8 mL of methanol into a 10-mL ground glass stoppered volumetric flask. Allow the flask to stand, unstoppered, for about 10 minutes or until all alcohol wetted surfaces have dried. Weigh the flask to the nearest 0.1 mg.

6.5.2 Add the assayed reference material as described below:

6.5.2.1 Liquids—Using a 100-µL syringe, immediately add two or more drops of assayed reference material to the flask, then reweigh. The liquid must fall directly into the alcohol without contacting the neck of the flask.

6.5.2.2 Gases—To prepare standards for any of the four halocarbons that boil below 30 °C (bromomethane, chloroethane, chloromethane, and vinyl chloride), fill a 5-mL valved gas-tight syringe with the reference standard to the 5.0-mL mark. Lower the needle to 5 mm above the methanol meniscus. Slowly introduce the reference standard above the surface of the liquid. The heavy gas rapidly dissolves in the methanol.

6.5.3 Reweigh, dilute to volume, stopper, then mix by inverting the flask several times. Calculate the concentration in micrograms per microliter from the net gain in weight. When compound purity is assayed to be 96% or greater, the weight may be used without correction to calculate the concentration of the stock standard. Commercially prepared stock standards may be used at any concentration if they are certified by the manufacturer or by an independent source.

6.5.4 Transfer the stock standard solution into a Teflon-sealed screw-cap bottle. Store, with minimal headspace, at −10° to −20 °C and protect from light.

6.5.5 Prepare fresh standards weekly for the four gases and 2-chloroethylvinyl ether. All other standards must be replaced after one month, or sooner if comparison with check standards indicate a problem.

6.6 Secondary dilution standards—Using stock standard solutions, prepare secondary dilution standards in methanol that contain the compounds of interest, either singly or mixed together. The secondary dilution standards should be prepared at concentrations such that the aqueous calibration standards prepared in Section 7.3.1 or 7.4.1 will bracket the working range of the analytical system. Secondary dilution standards should be stored with minimal headspace and should be checked frequently for signs of degradation or evaporation, especially just prior to preparing calibration standards from them. Quality control check standards that can used to determine the accuracy of calibration standards, will be available from the U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268.

6.7 Surrogate standard spiking solution—Select a minimum of three surrogate compounds from Table 3. Prepare stock standard solutions for each surrogate standard in methanol as described in Section 6.5. Prepare a surrogate standard spiking solution from these stock standards at a concentration of 150 μg/10 mL in water. Store the spiking solution at 4 °C in Teflon sealed glass containers with a minimum of headspace. The solutions should checked frequently for stability. They should be replaced after six months. The addition of 10 μL of this solution to 5 mL of sample or standard is equivalent to a concentration of 30 μg/L of each surrogate standard. Surrogate standard spiking solutions, appropriate for use with this method, will be available from the U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268.

6.8 BFB Standard—Prepare a 25 μg/μL solution of BFB in methanol.

7. Calibration

7.1 Assemble a purge and trap device that meets the specifications in Section 5.2. Condition the trap overnight at 180 °C by back flushing with an inert gas flow of at least 20 mL/min. Prior to use, daily condition traps 10 minutes while backflushing at 180 °C.

7.2 Connect the purge and trap device to a gas chromatograph. The gas chromatograph must be operated using temperature and flow rate parameters equivalent to those in Table 1. Calibrate the purge and trap-GC/MS system using either the external standard technique (Section 7.3) or the internal standard technique (Section 7.4).

7.3 External standard calibration procedure:

7.3.1 Prepare calibration standards at a minimum of three concentration levels for each parameter by carefully adding 20.0 μL of one or more secondary dilution standards to 50, 250, or 500 mL of reagent water. A 25-μL syringe with a 0.006 inch ID needle should be used for this operation. One of the external standards should be at a concentration near, but above, the MDL (See Table 1) and the other concentrations should correspond to the expected range of concentrations found in real samples or should define the working range of the GC/MS system. Aqueous standards may be stored up to 24 hours, if held in sealed vials with zero headspace as described in Section 9.2. If not so stored, they must be discarded after one hour.

7.3.2 Analyze each calibration standard according to Section 11, and tabulate the area response of the primary characteristic ion (See Table 4) against the concentration in the standard. The results can be used to prepare a calibration curve for each compound. Alternatively, if the ratio of response to concentration (calibration factor) is a constant over the working range (<10% relative standard deviation, RSD), linearity through the origin can be assumed and the average ratio or calibration factor can be used in place of a calibration curve.

7.3.3 The working calibration curve or calibration factor must be verified on each working day by the measurement of one or more calibration standards. If the response for any parameter varies from the predicted response by more than ± 10%, the test must be repeated using a fresh calibration standard. Alternatively, a new calibration curve or calibration factor must be prepared for that parameter.

7.4 Internal standard calibration procedure. To use this approach, the analyst must select one or more internal standards that are similar in analytical behavior to the compounds of interest. The analyst must further demonstrate that the measurement of the internal standard is not affected by method or matrix interferences. Because of these limitations, no internal standard can be suggested that is applicable to all samples. Due to their generally unique retention times, bromochloromethane, 2-bromo-1-chloropropane, and 1,4-dichlorobutane have been used successfully as internal standards.

7.4.1 Prepare calibration standards at a minimum of three concentration levels for each parameter of interest as described in Section 7.3.1.

7.4.2 Prepare a spiking solution containing each of the internal standards using the procedures described in Sections 6.5 and 6.6. It is recommended that the secondary dilution standard be prepared at a concentration of 15 μg/mL of each internal standard compound. The addition of 10 μL of this standard to 5.0 mL of sample or calibration standard would be equivalent to 30 μg/L.

7.4.3 Analyze each calibration standard, according to Section 11, adding 10 μL of internal standard spiking solution directly to the syringe (Section 11.4). Tabulate the area response of the characteristic ions against concentration for each compound and internal standard and calculate response factors (RF) for each compound using equation 1.

$$\text{Eq. 1 } RF = (A_sC_{is})/(A_{is}C_s)$$

where:

A_s = Area of the characteristic ion for the parameter to be measured.

A_{is} = Area of the characteristic ion for the internal standard.

C_{is} = Concentration of the internal standard.

C_s = Concentration of the parameter to be measured.

If the RF value over the working range is a constant (<10% RSD), the RF can be assumed to be invariant and the average RF can be used for calculations. Alternatively, the results can be used to plot a calibration curve or response ratios, A_s/A_{is}, vs. RF.

7.4.4 The working calibration curve or RF must be verified on each working day by the measurement of one or more calibration standards. If the response for any parameter varies from the predicted response by more than ± 10%, the test must be repeated using a fresh calibration standard. Alternatively, a new calibration curve must be prepared for that compound.

8. Quality Control

8.1 Each laboratory that uses this method is required to operate a formal quality control program. The minimum requirements of this program consist of an initial demonstration of laboratory capability and the analysis of spiked samples as a continuing check on performance. The laboratory is required to maintain performance records to define the quality of data that is generated. Ongoing performance checks must be compared with established performance criteria to determine if the results of analyses are within accuracy and precision limits expected of the method.

8.1.1 Before performing any analyses, the analyst must demonstrate the ability to generate acceptable accuracy and precision with this method. This ability is established as described in Section 8.2.

8.1.2 In recognition of the rapid advances that are occurring in chromatography, the analyst is permitted to certain options to improve the separations or lower the cost of measurements. Each time such modifications are made to the method, the analyst is required to repeat the procedure in Section 8.2.

8.1.3 The laboratory must spike all samples with surrogate standards to monitor continuing laboratory performance. This procedure is described in Section 8.4.

8.2 To establish the ability to generate acceptable accuracy and precision, the analyst must perform the following operations.

8.2.1 Select a representative spike concentration for each parameter to be measured. Using stock standards, prepare a quality control check sample concentrate in methanol 500 times more concentrated than the selected concentrations. Quality control check sample concentrates, appropriate for use with this method, will be available from the U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268.

8.2.2 Using a syringe, add 10 µL of the check sample concentrate and 10 µL of the surrogate standard dosing solution (Section 6.7) to each of a minimum of four 5-mL aliquots of reagent water. A representative wastewater may be used in place of the reagent water, but one or more additional aliquots must be analyzed to determine background levels, and the spike level must exceed twice the background level for the test to be valid. Analyze the aliquots according to the method beginning in Section 11.

8.2.3 Calculate the average percent recovery, (R), and the standard deviation of the percent recovery (s), for all parameters and surrogate standards. Wastewater background corrections must be made before R and s calculations are performed.

8.2.4 Using Table 5, note the average recovery (X) and standard deviation (p) expected for each method parameter. Compare these to the calculated values for R and s. If $s > p$ or $|X - R| > p$, review potential problem areas and repeat the test.

8.2.5 The U.S. Environmental Protection Agency plans to establish performance criteria for R and s based upon the results of interlaboratory testing. When they become available, these criteria must be met before any samples may be analyzed.

8.3 The analyst must calculate method performance criteria for each of the surrogate standards.

8.3.1 Calculate upper and lower control limits for method performance for each surrogate standard, using the values for R and s calculated in Section 8.2.3:

$$\text{Upper Control Limit (UCL)} = R + 3s$$
$$\text{Lower Control Limit (LCL)} = R - 3s$$

The UCL and LCL can be used to construct control charts(8) that are useful in observing trends in performance. The control limits above must be replaced by method performance criteria as they become available from the U.S. Environmental Protection Agency.

8.3.2 For each surrogate standard, the laboratory must develop and maintain separate accuracy statements of laboratory performance for wastewater samples. An accuracy statement for the method is defined as R ± s. The accuracy statement should be developed by the analysis of four aliquots of wastewater as described in Section 8.2.2, followed by the calculation of R and s. Alternately, the analyst may use four wastewater data points gathered through the requirement for continuing quality control in Section 8.4. The accuracy statements should be updated regularly(8).

8.4 The laboratory is required to spike all of their samples with the surrogate standard spiking solution to monitor spike recoveries. If the recovery for any surrogate standard does not fall within the control limits for method performance, the results reported for that sample must be qualified as described in Section 13.3. The laboratory should monitor the frequency of data so qualified to ensure that it remains at or below 5%.

8.5 Each day, the analyst must demonstrate, through the analysis of reagent water, that interferences from the analytical system are under control.

8.6 It is recommended that the laboratory adopt additional quality assurance practices for use with this method. The specific practices that are most productive depend upon the needs of the laboratory and the nature of the samples. Field duplicates may be analyzed to monitor the precision of the sampling technique. Whenever possible, the laboratory should perform analysis of standard reference materials and participate in relevant performance evaluation studies.

9. Sample Collection, Preservation, and Handling

9.1 All samples must be iced or refrigerated from the time of collection until extraction. If the sample contains residual chlorine, add sodium thiosulfate preservative (10 mg/40 mL is sufficient for up to 5 ppm Cl_2) to the empty sample bottles just prior to shipping to the sampling site. U.S. Environmental Protection Agency methods 330.4 and 330.5 may be used for measurement of residual chlorine(9). Field test kits are available for this purpose.

9.2 Grab samples must be collected in glass containers having a total volume of at least 25 mL. Fill the sample bottle just to overflowing in such a manner that no air bubbles pass through the sample as the bottle is being filled. Seal the bottle so that no air bubbles are entrapped in it. If preservative has been added, shake vigorously for one minute. Maintain the hermetic seal on the sample bottle until time of analysis.

9.3 Experimental evidence indicates that some aromatic compounds, notably benzene, toluene, and ethyl benzene are susceptible to rapid biological degradation under certain environmental conditions(3). Refrigeration along may not be adequate to preserve these compounds in wastewaters for more than seven days. For this reason, a separate sample should be collected, acidified, and analyzed when these aromatics are to be determined. Collect about 500 mL of sample in a clean container. Adjust the pH of the sample to about 2 by adding HCl (1 + 1) while stirring. Check pH with narrow range (1.4 to 2.8) pH paper. Fill a sample container as described in Section 9.2. If chlorine residual is present, add sodium thiosulfate to another sample container and fill as in Section 9.2 and mix thoroughly.

9.4 All samples must be analyze within 14 days of collection.

10. Daily GC/MS Performance Tests

10.1 At the beginning of each day that analyses are to be performed, the

GC/MS system must be checked to see if acceptable performance criteria are achieved for BFB[10]. The performance test must be passed before any samples, blanks, or standards are analyzed, unless the instrument has met the DFTPP test described in method 625 earlier in the day[11].

10.2 These performance tests require the following instrumental parameters.

Electron Energy: 70 Volts (nominal)
Mass Range: 20 to 260
Scan Time: to give at least 5 scans per peak but not to exceed 7 seconds per scan.

10.3 At the beginning of each day, inject 2 µL of BFB solution directly on column. Alternately, add 2 µL of BFB solution to 5.0 mL of reagent water or standard solution and analyze according to Section 11. Obtain a background corrected mass spectrum of BFB and check that all the key ion criteria in Table 2 are achieved. If all the criteria are not achieved, the analyst must retune the mass spectrometer and repeat the test until all criteria are achieved.

11. Sample Extraction and Gas Chromatography

11.1 Table 1 summarizes the recommended operating conditions for the gas chromatograph. This table includes retention times and method detection limits that were achieved under these conditions. An example of the parameter separations achieved by Column 1 is shown in Figure 5. Other packed columns or chromatographic conditions may be used if the requirements of Section 8.2 are met.

11.2 After achieving the key ion abundance criteria in Section 10, calibrate the system daily as described in Section 7.

11.3 Adjust the purge gas (helium) flow rate to 40 ± 3 mL/min. Attach the trap inlet to the purging device, and set the device to purge. Open the syringe valve located on the purging device sample introduction needle.

11.4 Remove the plunger from a 5-mL syringe and attach a closed syringe valve. Open the sample or standard bottle which has been allowed to come to ambient temperature, and carefully pour the sample into the syringe barrel to just short of overflowing. Replace the syringe plunger and compress the sample. Open the syringe valve and vent any residual air while adjusting the sample volume to 5.0 mL. Since this process of taking an aliquot destroys the validity of the sample for future analysis, the analyst should fill a second syringe at this time to protect against possible loss of data. Add 10.0 µL of the surrogate spiking solution (Section 6.7) and, if applicable, 10.0 µL of the internal standard spiking solution (Section 7.4.2) through the valve bore, then close the valve. The surrogate and internal standards may be mixed and added as a single spiking solution.

11.5 Attach the syringe-syringe valve assembly to the syringe valve on the purging device. Open the syringe valves and inject the sample into the purging chamber.

11.6 Close both valves and purge the sample for 11.0 ± 0.1 minutes at ambient temperature.

11.7 At the conclusion of the purge time, attach the trap to the chromatograph, adjust the device to the desorb mode, and begin the gas chromatographic temperature program. Concurrently, introduce the trapped materials to the gas chromatographic column by rapidly heating the trap to 180 °C while backflushing the trap with an inert gas between 20 and 60 mL/min for four minutes. If this rapid heating requirement cannot be met, the gas chromatographic column must be used as a secondary trap by cooling it to 30 °C (or subambient, if problems persist) instead of the recommended initial temperature of 45 °C.

11.8 While the trap is being desorbed into the gas chromatograph, empty the purging chamber using the sample introduction syringe. Wash the chamber with two 5-mL flushes of reagent water.

11.9 After desorbing the sample for four minutes, recondition the trap by returning the purge and trap device to the purge mode. Wait 15 seconds then close the syringe valve on the purging device to begin gas flow through the trap. The trap temperature should be maintained at 180 °C. Trap temperatures up to 230 °C may be employed, however, the higher temperature will shorten the useful life of the trap. After approximately seven minutes turn off the trap heater and open the syringe valve to stop the gas flow through the trap. When cool, the trap is ready for the next sample.

11.10 If the response for any ion exceeds the working range of the system, dilute the sample aliquot in the second syringe with reagent water and reanalyze.

12. Qualitative Identification

12.1 Obtain EICPs for the primary ion (Table 4) and at least two secondary ions for each parameter of interest. The following criteria must be met to make a qualititative identification.

12.1.1 The characteristic ions of each parameter of interest must maximize in the same or within one scan of each other.

12.1.2 The retention time must fall within ±30 seconds of the retention time of the authentic compound.

12.1.3 The relative peak heights of the three characteristic ions in the EICPs must fall within ±20% of the relative intensities of these ions in a reference mass spectrum. The reference mass spectrum can be obtained from a standard analyzed in the GC/MS system or from a reference library.

12.2 Structural isomers that have very similar mass spectra and less than 30 seconds difference in retention time, can be explicitly identified only if the resolution between authentic isomers in a standard mix is acceptable. Acceptable resolution is achieved if the baseline to valley height between the isomers is less than 25% of the sum of the two peak heights. Otherwise, structural isomers are identified as isomeric pairs.

13. Calculations

13.1 When a parameter has been identified, the quantitation of that parameter should be based on the integrated abundance from the EICP of the first listed characteristic ion given in Table 4. If the sample produces an interference for the primary ion, use a secondary characteristic ion to quantitate. Quantitation may be performed using the external or internal standard techniques.

13.1.1 If the external standard calibration procedure is used, calculate the concentration of the parameter being measured from the area of the characteristic ion using the calibration curve or calibration factor in Section 7.3.2.

13.1.2 If the internal standard calibration procedure was used, calculate the concentration in the sample using the response factor (RF) determined in Section 7.4.3 and equation 2.

Eq. 2.

$$\text{Concentration } \mu g/L = (A_s C_{is})/(A_{is})(RF)$$

where:

A_s = Area of the characteristic ion for the parameter or surrogate standard to be measured.
A_{is} = Area of the characteristic ion for the internal standard.
C_{is} = Concentration of the internal standard.

13.2 Report results in micrograms per liter. The results for cis- and trans-1,3 dichloropropene should be reported as total 1,3-dichloropropene (STORET No. 34561, CAS No. 542-75-6). When duplicate and spiked samples are analyzed, report all data obtained with the sample results.

13.3 If any of the surrogate standard recoveries fall outside the control limits which were established as directed in Section 8.4, data for all parameters determined by this method in that sample must be labeled as suspect.

14. Method Performance

14.1 The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the value is above zero(1). The MDL concentrations listed in Table 1 were obtained using reagent water(12). Similar results were achieved using representative wastewaters.

14.2 The average recoveries and the average standard deviations of the percent recoveries, presented in Table 5, were the result of a study of the accuracy and precision of this method by several laboratories. The values listed represent the results from 2 to 4 laboratories(13).

14.3 The U.S. Environmental Protection Agency is in the process of conducting an interlaboratory method study to fully define the performance of this method.

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Table 1. *Chromatographic Conditions and Method Detection Limits*

Parameter	*Retention Time (min.) Column 1*	*Method Detection Limit (μg/L)*
Chloromethane	2.3	nd
Bromomethane	3.1	nd
Vinyl chloride	3.8	nd
Chloroethane	4.6	nd
Methylene chloride	6.4	2.8
Trichlorofluoromethane	8.3	nd
1,1-Dichloroethene	9.0	2.8
1,1-Dichloroethane	10.1	4.7
trans-1,2-Dichloroethene	10.8	1.6
Chloroform	11.4	1.6
1,2-Dichloroethane	12.1	2.8
1,1,1-Trichloroethane	13.4	3.8
Carbon tetrachloride	13.7	2.8
Bromodichloromethane	14.3	2.2
1,2-Dichloropropane	15.7	6.0
trans-1,3-Dichloropropene	15.9	5.0
Trichloroethene	16.5	1.9
Benzene	17.0	4.4
Dibromochloromethane	17.1	3.1
1,1,2-Trichloroethane	17.2	5.0
cis-1,3-Dichloropropene	17.2	nd
2-Chloroethylvinyl ether	18.6	nd
Bromoform	19.8	4.7
1,1,2,2-Tetrachloroethane	22.1	6.9
Tetrachloroethene	22.2	4.1
Toluene	23.5	6.0
Chlorobenzene	24.6	6.0
Ethyl benzene	26.4	7.2
1,3-Dichlorobenzene	33.9	nd
1,2-Dichlorobenzene	35.0	nd
1,4-Dichlorobenzene	35.4	nd

nd = not determined

Column conditions: Carbopak B (60/80 mesh) coated with 1% SP-1000 packed in a 6 ft by 2 mm ID glass column with helium carrier gas at a flow rate of 30 mL/min. Column temperature is isothermal at 45°C for 3 min, then programmed at 8°C per minute to 220°C and held for 15 min.

Table 2. *BFB Key Ion Abundance Criteria*

Mass	*Ion Abundance Criteria*
50	15 to 40% of mass 95
75	30 to 60% of mass 95
95	Base Peak, 100% Relative Abundance
96	5 to 9% of mass 95
173	<2% of mass 174
174	>50% of mass 95
175	5 to 9% of mass 174
176	>95% but < 101% of mass 174
177	5 to 9% of mass 176

Table 3. *Suggested Surrogate and Internal Standards*

Compound	Retention Time (min.)[a]	Primary Ion	Secondary Ions
Surrogate Standards			
Benzene d-6	17.0	84	—
4-Bromofluorobenzene	28.3	95	174, 176
1,2-Dichloroethane d-4	12.1	102	—
1,4-Difluorobenzene	19.6	114	63, 88
Ethylbenzene d-5	26.4	111	—
Ethylbenzene d-10	26.4	98	—
Fluorobenzene	18.4	96	70
Pentafluorobenzene	23.5	168	—
Internal Standards			
Bromochloromethane	9.3	128	49, 130, 51
2-Bromo-1-chloropropane	19.2	77	79, 156
1,4-Dichlorobutane	25.8	55	90, 92

[a] *For chromatographic conditions, see Table 1.*

Table 4. *Characteristic Ions for Purgeable Organics*

Parameter	Primary Ion	Secondary Ions
Chloromethane	50	52
Bromomethane	94	96
Vinyl chloride	62	64
Chloroethane	64	66
Methylene chloride	84	49, 51, 86
Trichlorofluoromethane	101	103
1,1-Dichloroethene	96	61, 98
1,1-Dichloroethane	63	65, 83, 85, 98, 100
trans-1,2-Dichloroethene	96	61, 98
Chloroform	83	85
1,2-Dichloroethane	98	62, 64, 100
1,1,1-Trichloroethane	97	99, 117, 119
Carbon tetrachloride	117	119, 121
Bromodichloromethane	127	83, 85, 129
1,2-Dichloropropane	112	63, 65, 114
trans-1,3-Dichloropropene	75	77
Trichloroethene	130	95, 97, 132
Benzene	78	
Dibromochloromethane	127	129, 208, 206
1,1,2-Trichloroethane	97	83, 85, 99, 132, 134
cis-1,3-Dichrloropropene	75	77
2-Chloroethylvinyl ether	106	63, 65
Bromoform	173	171, 175, 250, 252, 254, 256
1,1,2,2-Tetrachloroethane	168	83, 85, 131, 133, 166
Tetrachloroethene	164	129, 131, 166
Toluene	92	91
Chlorobenzene	112	114
Ethyl benzene	106	91
1,3-Dichlorobenzene	146	148, 113
1,2-Dichlorobenzene	146	148, 113
1,4-Dichlorobenzene	146	148, 113

Table 5. *Accuracy and Precision for Purgeable Organics*

Parameter	Reagent Water: Average Percent Recovery	Reagent Water: Standard Deviation (%)	Wastewater: Average Percent Recovery	Wastewater: Standard Deviation (%)
Benzene	99	9	98	10
Bromodichloromethane	102	12	103	10
Bromoform	104	14	105	16
Bromomethane	100	20	88	23
Carbon tetrachloride	102	16	104	15
Chlorobenzene	100	7	102	9
Chloroethane	97	22	103	31
2-Chloroethylvinyl ether	101	13	95	17
Chloroform	101	10	101	12
Chloromethane	99	19	99	24
Dibromochloromethane	103	11	104	14
1,1-Dichloroethane	101	10	104	15
1,2-Dichloroethane	100	8	102	10
1,1-Dichloroethene	102	17	99	15
trans-1,2-Dichloroethene	99	12	101	10
1,2-Dichloropropane	102	8	103	12
cis-1,3-Dichloropropene	105	15	102	19
trans-1,3-Dichloropropene	104	11	100	18
Ethyl benzene	100	8	103	10
Methylene chloride	96	16	89	28
1,1,2,2-Tetrachloroethane	102	9	104	14
Tetrachloroethene	101	9	100	11
Toluene	101	9	98	14
1,1,1-Trichloroethane	101	11	102	16
1,1,2-Trichloroethane	101	10	104	15
Trichloroethene	101	9	100	12
Trichlorofluoromethane	103	11	107	19
Vinyl chloride	100	13	98	25

Samples were spiked between 10 and 1000 µg/L.

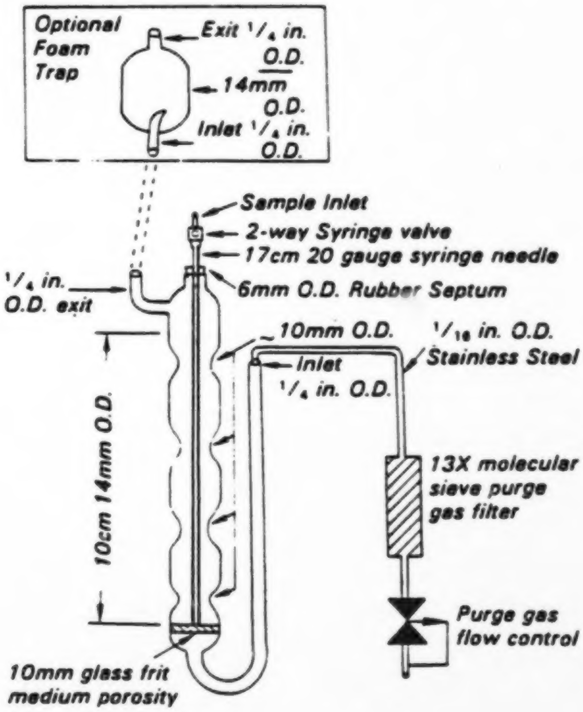
Optional Foam Trap
Exit 1/4 in. O.D.
14mm O.D.
Inlet 1/4 in. O.D.
Sample Inlet
2-way Syringe valve
17cm 20 gauge syringe needle
1/4 in. O.D. exit
6mm O.D. Rubber Septum
10mm O.D.
1/16 in. O.D. Stainless Steel
Inlet 1/4 in. O.D.
10cm 14mm O.D.
13X molecular sieve purge gas filter
Purge gas flow control
10mm glass frit medium porosity

Figure 1. *Purging device*

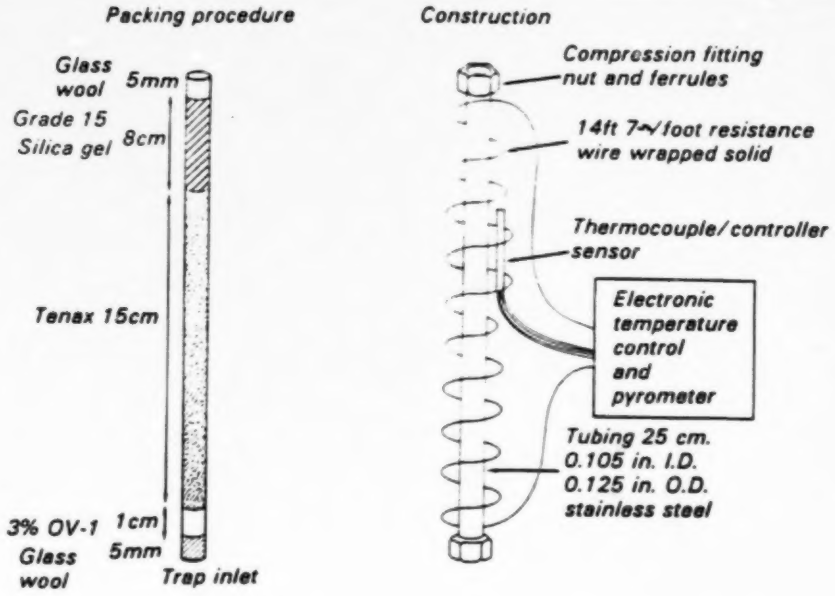
Packing procedure
Construction
Glass wool
5mm
Grade 15 Silica gel
8cm
Tenax 15cm
3% OV-1
1cm
Glass wool
5mm
Trap inlet
Compression fitting nut and ferrules
14ft 7~/foot resistance wire wrapped solid
Thermocouple/controller sensor
Electronic temperature control and pyrometer
Tubing 25 cm. 0.105 in. I.D. 0.125 in. O.D. stainless steel

Figure 2. *Trap packings and construction to include desorb capability*

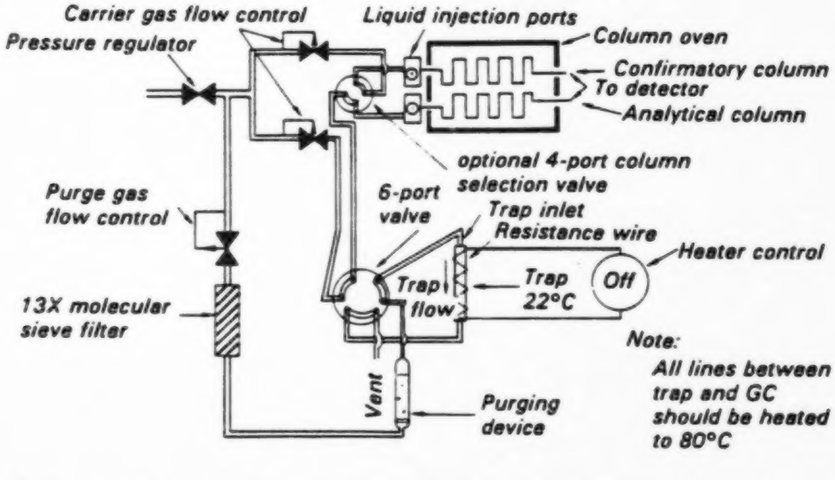
Carrier gas flow control
Pressure regulator
Liquid injection ports
Column oven
Confirmatory column
To detector
Analytical column
optional 4-port column selection valve
Purge gas flow control
6-port valve
Trap inlet
Resistance wire
Heater control
Off
Trap flow
Trap 22°C
13X molecular sieve filter
Vent
Purging device
Note: All lines between trap and GC should be heated to 80°C

Figure 3. *Schematic of purge and trap device — purge mode*